THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXII. No. 1850.] LONDON, OCTOBER 25, 1898. [50TH YEAR. PRICE 6d.

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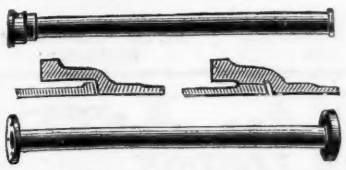
1¼ to 12 IN. BORE.



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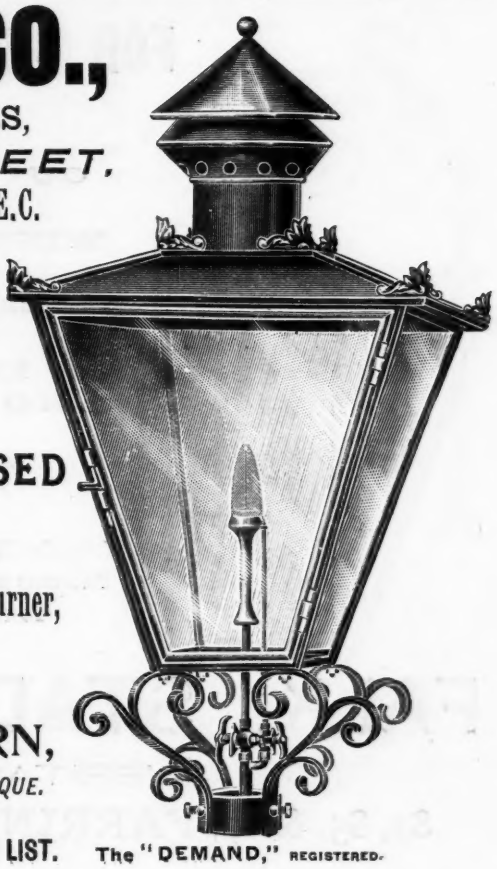
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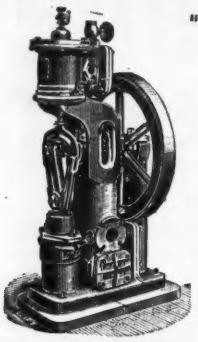

Fig. 705. "SINGLE RAM" STEAM-PUMP.

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

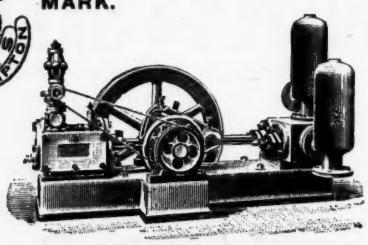

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

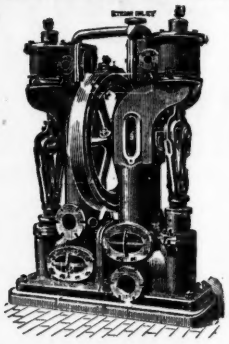

Fig. 712 "DOUBLE-RAM" STEAM-PUMP.

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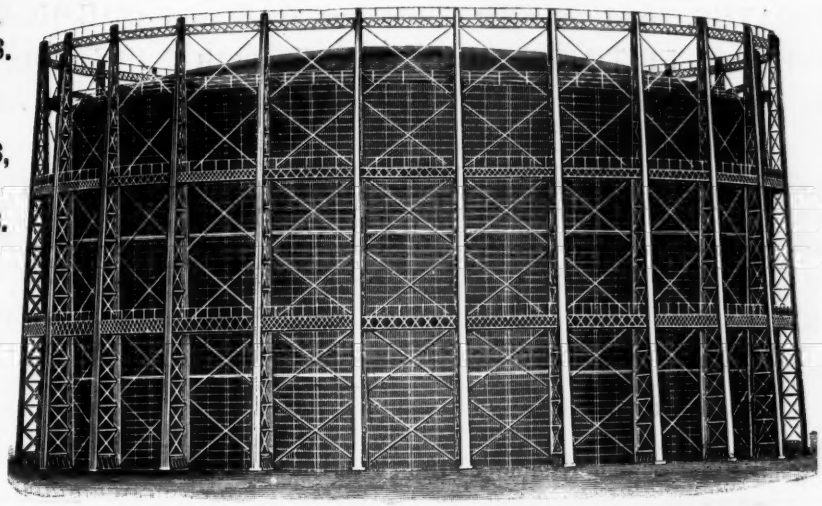

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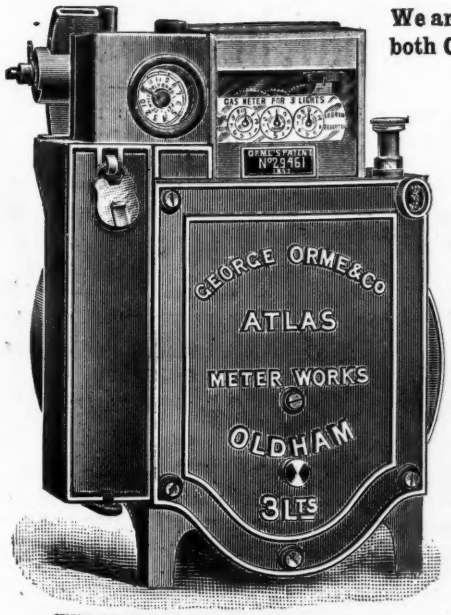

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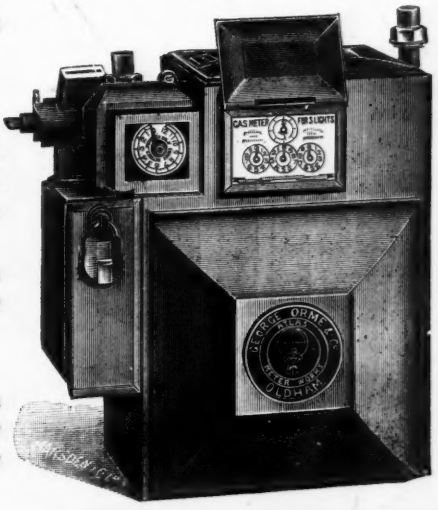

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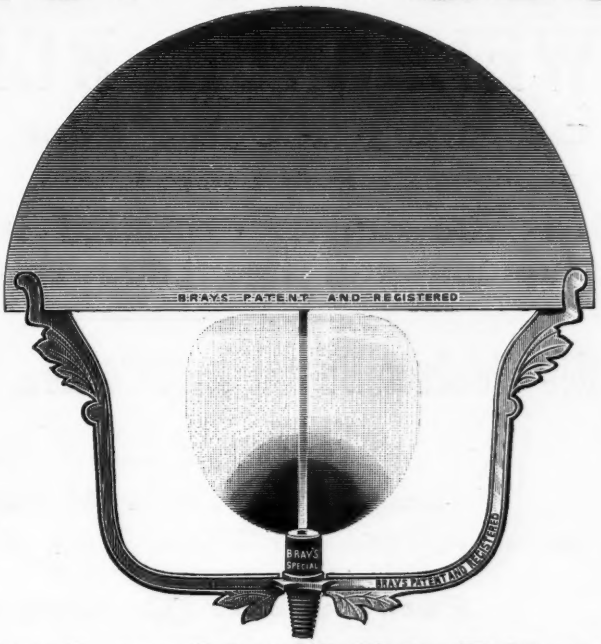

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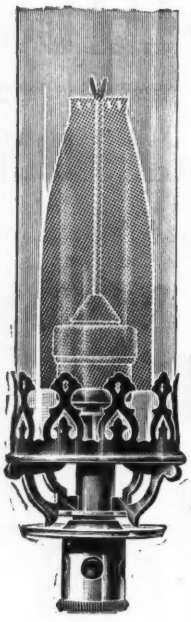

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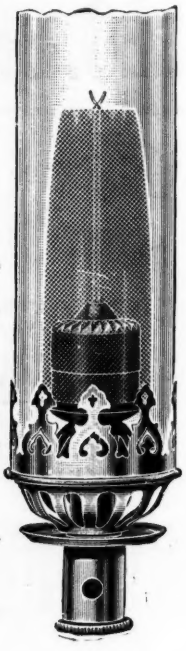

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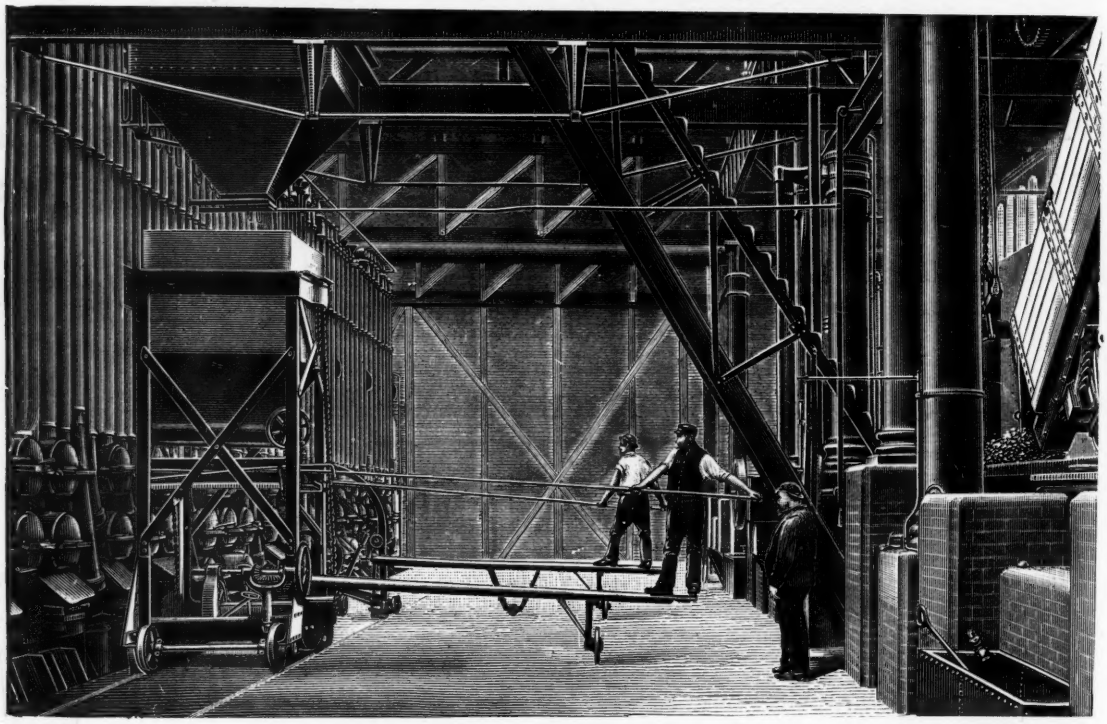

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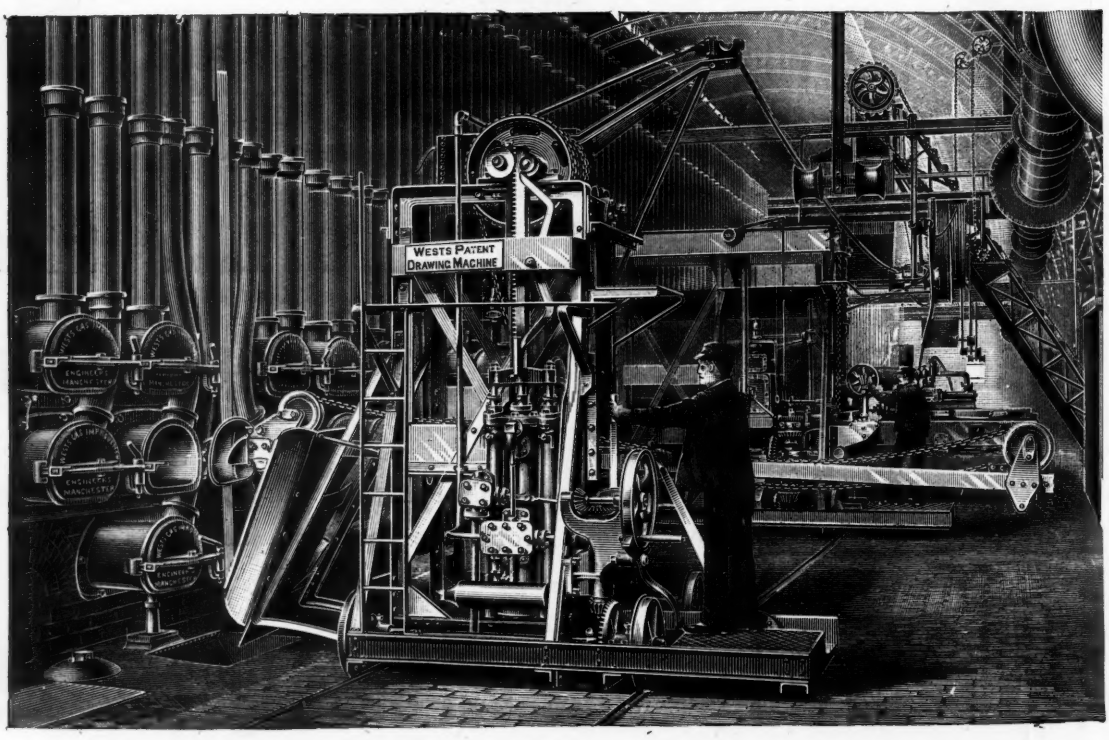

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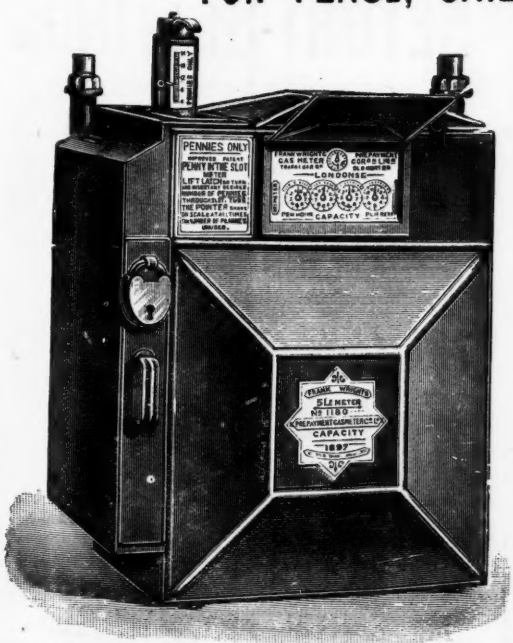

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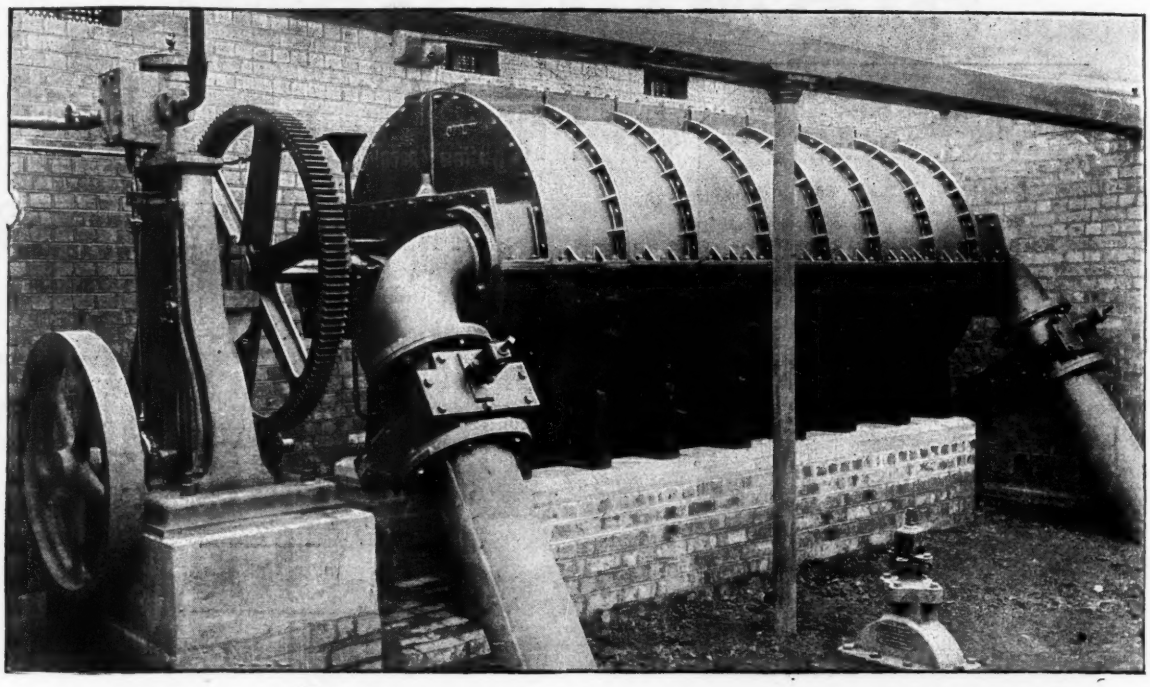

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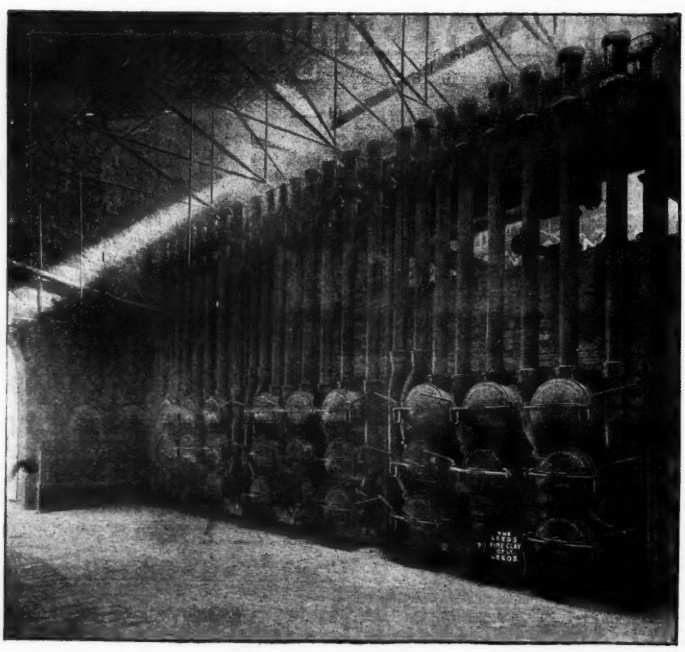

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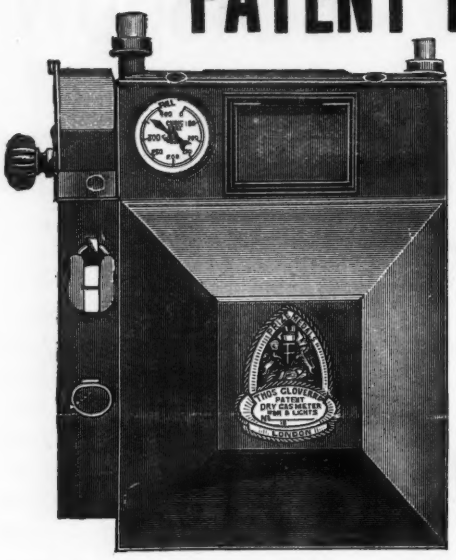

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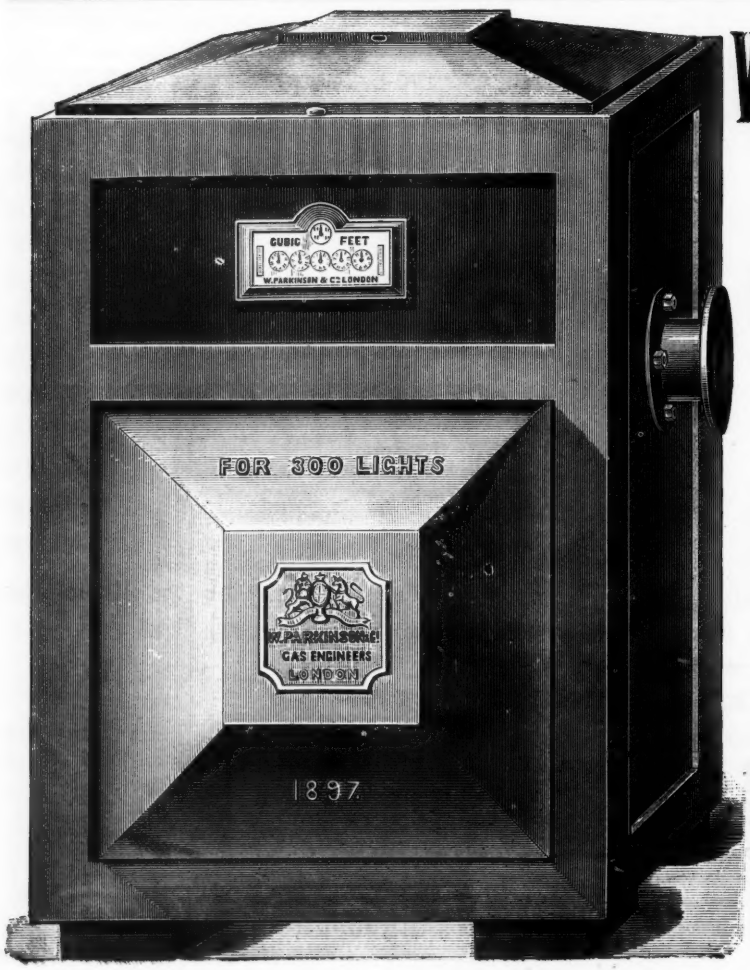

W. PARKINSON & Co.

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WET AND DRY METERS

OF ALL DESCRIPTIONS KEPT

IN STOCK.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

EDITORIAL NOTES.

The Pay and Prospects of London Gas Stokers.

IT was announced in last week's "JOURNAL" that an advance of wages had been given to the stokers of the South Metropolitan and Crystal Palace Gas Companies, in recognition of the fact that the wages of general labourers, from which class retort-house hands are drawn, have risen considerably of late years. The Directors of these two Companies experienced the less reluctance in making this concession, inasmuch as their men, not being under the influence of any Trade Union, have worked well and fairly. The advance of wages is therefore an encouragement as well as an adjustment of rate to the conditions of the labour market of the London district. It is worthy of being put upon record as a further proof of the truth that Trade Unions are not necessary to this process of adjustment. In the case of London gas workers, the rates of wages paid are bound to be uniform throughout the district; and accordingly it was inevitable that The Gaslight and Coke Company should follow the South Metropolitan lead, as they did last week. Unfortunately, the carbonizing expenses of the different London Gas Companies do not bear the construction that a true friend of Trade Unionism would desire, by proving that there is equality of performance as well as of pay. All the London Gas Companies are good paymasters; but unhappily they do not all get the same return. The Gas Workers' Union is fast enough in prompting its members to ask for more money, whenever and wherever there seems to be the smallest prospect of getting it. The Union hands have not forgotten the disappointments of 1889; but in London at least the Union Executive has kept quiet for some years. We have lately recorded movements on the part of the Union in different places in the country; and London was certain to feel much the same impulse sooner or later. During the past week, the London newspapers published references to the existence of discontent among the Beckton stokers; and the ominous heading, "Gas Workers' Agitation," once more appeared in these prints. It is always difficult to trace the origin of movements of this kind. A News Agency puts it that, "in face of the demands of the gas workers employed at "the various stations in connection with The Gaslight and "Coke Company, the Commercial Company, and the West "Ham Company, who have decided to ask their employers "for an increase of 15 per cent. in their wages," the Secretary of the Executive Council of the Gas Workers' Union issued the "manifesto," the terms of which we reproduce in another column. It is to be noted that this circular is not dated, so that it is impossible to say whether it is to be regarded as cause or effect of whatever "demand" may have been preferred to the Companies named, by or on behalf of the stokers. The circular tells the carbonizing workmen that they "have not had any direct "increase of wages for the past 22 years, whilst at the "same time the wages of all classes of workmen have "been increased at least 25 per cent." The men are implored to join the Union, with the object of wringing from the Companies the advance of pay which this organization was formed and endeavoured to obtain in 1889. This is as much as to say that, in the judgment of the Union Executive, the opportunity has come at last for taking up the cause which had to be dropped in 1889. It was the extra shilling a day that the men who joined the Union really wanted then; and, of course, they would like it now. At first, the Union concentrated their energies to secure the eight-hour shift; and, possibly to the agitators' surprise, they discovered that they had undertaken "to force "an open door." On Sunday, July 28, 1889, a mass meeting of gas workers was held in Hyde Park, to celebrate their "victory" in getting the eight-hour day, when not a word was said in acknowledgment of the fact that the victory had been gained without fighting, or in confession of the equally important truth that the other shilling a day would have been better appreciated.

It was not long after this that the Union took the next step, by formally notifying that none but members would be allowed to take service under the London Gas Companies; and thenceforward the struggle as to who should be master went on to the settlement which is matter of history. It is needless to recount the story of how the brunt of the Union attack fell upon the South Metropolitan

Gas Company; but it should be borne in mind that in this conflict the whole strength of the Union was spent, leaving nothing for furthering the desire of the members employed at other London gas-works for higher pay. So the matter was allowed to drop for awhile. In the usual way of such pronouncements, the new circular makes an attempt to persuade the gas workers that they are injured men. It sings the old song about the men having to carbonize more coal, "in consequence of the "scoops being made deeper, wider, and heavier;" and asserts that the "nigger-driving" that "prevailed before "the Union started is becoming the practice again." It has ever been a trick of the labour agitator to tell the men that they are being "put upon" in some way or another. This time, however, the pretence is too thin. If the carbonizing expenses of the London Companies mean anything at all, it is something wholly different from Mr. Thorne's fond imaginings. The gas workers of London have only to do a fair day's work, and their employers will pay them a fair day's wages for it. If the Union gives further trouble, the immediate effects, whatever they may be, will be of little importance compared with the ulterior results. We have ere now published an article describing the making of gas without the help of stokers at all. If this is what it must come to in London, so be it. The old men in the workhouses a few years hence will know whom to thank for loss of employment, pension, and freedom.

Some Features of the Gas Legislation of the Year.

The abstracts of the Gas Acts for the year, which it is our custom to publish at this season, permit the student to ascertain the drift of contemporary parliamentary practice in this department of legislation. There has been a somewhat heavy crop of these Acts; and several of them will repay very attentive consideration. The interest of those who are not particularly affected by such Acts is divided between those of the clauses that are old, and those that have some pretension to novelty. It is not for us to emulate the performances in criticism of the Liberty and Property Defence League, which, proceeding on the assumption that all legislation is of the nature of a restriction of man's natural rights, pokes ponderous fun at the statutory privileges conferred by Private Acts. We are pleased to record the fact that gas supply continues to give Parliament a good deal of work every year. Last session was remarkable for the number of Gas-Works Transfer Bills passed into law. A highly gratifying feature of most of these measures was the solicitude shown for the interest of old employees of the Companies; and we have already taken occasion to commend the Yeovil case for remembrance on this account. It was high time that the subject should be properly dealt with, and fair treatment of Company's officers and servants erected into a precedent. The natural desire in many instances for trying the effect of "new brooms" should not be indulged at the sole expense of the old hands; but it is for the outgoing proprietors to insist upon this condition of the transfer of gas property. The fashion for consolidating and unifying Gas Companies' capital is well exemplified. The sanctity of the initial price under the sliding-scale has been maintained.

The subject of the consolidation of Gas Companies' capital, and the bearings of the operation upon the undertaking and the proprietors' and consumers' interests, ought to be exhaustively treated by a paper and a discussion at a technical gathering. It might be taken into consideration in connection with the comparatively new rule making Local Authorities' gas-works extension loans repayable within forty years. Under these conditions, how much remains of the familiar argument in favour of the municipalization of gas-works, that Local Authorities can borrow money for capital purposes at a cheaper rate than Gas Companies can raise additional capital? The Public Works Loan Board will now lend money for forty years at 3 per cent. Gas Companies can dispose of permanent debentures for less. The paper might raise the independent question of whether gas capital standing at more than current values should be extinguished, and how.

Some of the Standing Order clauses of Gas Acts might be overhauled in the light of facts. What of that curious prohibition of the compulsory removal from their dwellings of members of the labouring classes? In how many instances is such a prohibition needed? The occasional clauses of some of the Acts are suggestive. There is an echo of litigation in the permission accorded to the Enfield Company to use their gas-mains for ancillary purposes. It seems strange that gas undertakings should require parliamentary sanction for such an ordinary trade precaution as the demanding of payment in advance—that is to say, "cash with order"—where this is deemed desirable. The limitation of the period during which a consumer's defective meter is to be presumed to have registered erroneously, is still subject to a little confusion. When the matter was first dealt with in Bills, it was sought to limit the period for correction to the current quarter of the year. As we pointed out, this is an absurdity; for in the usual way the meter would show itself defective at the registration for the previous quarter. It is now customary to limit the period of correction to the "last preceding quarter," although there is no unanimity in this regard. The power to inspect new interior fittings in houses is given in several instances, with the right of refusal of the supply unless the result of the inspection is satisfactory. In some cases, the consumer has a right of appeal to two Justices against an adverse decision in this regard; but not everywhere. The subletting of dwellings for a limited period is recognized in a few Acts. Some Companies are not liable for penalties in the event of defective supply capable of being referred to an "unavoidable cause." Several Acts provide for the recovery of demands under £50 in the County Court. A few Gas Companies are permitted to employ their capital in applying for and working an Electric Lighting Order; but nothing more in this regard is ever granted to them.

An Aspect of Municipalism.

The Association of Municipal Corporations have held their autumn general meeting, under the presidency of Sir A. K. Rollit, M.P.; and there was a numerous attendance. The subjects of discussion brought under the notice of the august assembly might be described as "various," seeing that they ranged all the way from the assessment of Government property to the question of the inclusion of fried-fish shops in the list of offensive trades under the Public Health Act. It would be difficult to say off-hand which is the more important topic of the two. The subject that seems to have stirred the meeting to its depths, however, was that of a resolution moved by the Mayor of Nottingham affirming the principle "that where Local "Authorities have, with the sanction of Parliament, established or are in the course of establishing undertakings "for public benefit, and have not failed in the performance "of their duties, it is not right or expedient that powers "should be granted to Companies to compete with such "Local Authorities." This is good, sound, mouth-filling language; but it seems to lack pointed application. This was supplied in the explanatory speech of the worshipful mover of the resolution, who began by remarking that nothing had tended in a greater degree to the well-being of the inhabitants of English towns than the action of the Corporations, under the direct sanction and authority of Parliament, in acquiring gas and water undertakings. When electricity supply came to the fore as a town requisite, the Corporations understood that Parliament would treat them as in the cases of gas and water supply. This impression was strengthened by the action of the Board of Trade under the Electric Lighting Act.

In these latter days, however, the confidence of municipalities in their monopolistic privilege has been rudely shaken by the circumstance of the House of Lords having passed the Bill of the General Power Distributing Company—a measure containing "most revolutionary "proposals." It actually contemplates the invasion of Nottingham, with other places, by a Company proposing to supply cheaper electricity than the Corporation, with an eye to profits in aid of rates, can distribute the same commodity! "In a short time the Nottingham Corpora-"tion will have spent close on half-a-million sterling on "electrical undertakings. The Association could imagine "their dismay when they learnt that by means of a "Private Bill they were to be subjected to the competition "of a *Company working for a profit*." The italics are ours. The cry of alarm raised by the Mayor of Nottingham was echoed by the Lord Mayor of Sheffield, his Lordship of Manchester, and half-a-dozen other spokesmen of municipal trading interests. The Town Clerk of Liverpool appears to have been desirous of a hearing "on the other "side;" but he did not venture to say much in opposition to the stormy abuse levelled at this "iniquitous Bill," as the measure was called by the Lord Mayor of Manchester,

who declared his disbelief that the House of Commons will ever pass it. We shall see. One thing at least is certain—if this or any other similar Bill does pass the Commons, it will be on account of the grasping after profits by the Corporations of Manchester and some other places, who have charged what they liked for gas, regardless of the broad interests of the community. Parliament is not an association of municipalities exercising, or hoping to acquire, any monopolies for the supply of the necessaries of town life. There was not a municipal magnate at the meeting who had the boldness and fairness to ask what would have been the attitude of the Corporations to the Bill in question, supposing it to have threatened Electric Lighting Companies instead of Corporations. Would not the Mayors and Town Clerks have declared that the chief interest of their people was in getting the cheapest possible supply of electricity for lighting and tramway working? Would they not have said, as one man, that if the small local Companies could not do the work as cheaply as the big general concern, it might be so much the worse for them; but the interest of the public must be paramount? And now the Mayor of Nottingham is afraid of a Company proposing to work "for a profit"—why? Because the interest of Nottingham in cheap electricity is confused with that of the Corporation in the profits of the business. Who is to fix a standard of value for electricity in Nottingham, or any other town?

Unfortunately for themselves, the Corporations owning gas undertakings have shown that they are not to be trusted to sell gas at the lowest possible price. They make up their municipal minds as to what is a "reasonable" price for the article, such as it is, and take the "profits." The Mayor of Nottingham talks at large about the benefit to town populations that has accrued from the municipalization of the gas supply; but it is the fact that few municipalities sell gas as cheaply as a Company in the same district would do it—with the Municipality keeping a sharp look-out upon the quality of the service. The truth of the present matter is that those English Municipalities supplying electricity that have turned the corner of solvent working, have already exhibited the desire to grasp after profits; and this has "shown the red light" to Parliament. The proof is to be read in the Telephone Committee's report of last session. Is everything that can be municipalized, like gas, to be made subservient to the desire of Local Authorities to escape the obligation to charge all their expenditure upon the rates? Are popular Mayors everywhere to clear away slums and lay out squares, called by their own names, at the expense of the users of Corporation services? Of course, this is a very objectionable suggestion; but it is not wholly without justification, as many Mayors and Town Clerks will agree, if they will glance at some other towns than their own. Electricity supply is an infant. Nobody can foresee its growth and development. A few years ago everybody thought municipal central stations for generating the small amount of electricity required for lighting purposes would be safe from injurious competition. Now an outsider threatens, in some places, to do the same work at half the price. Why should the Municipality stand in his way? They had far better make a deal with him before he starts.

Cases under the Workmen's Compensation Act.

It is greatly to be desired that readers of the "Journal" who may be in a position to supply information concerning the operation of the Workmen's Compensation Act in disputed cases, will not neglect to communicate with us, on the mistaken supposition that we are in a position to know what goes on in all the County Court circuits throughout the country. For some time to come, the County Courts will have the settling of the law under this Act; and there is no knowing how it will work out. At Liverpool recently, His Honour Judge Collier, sitting as Arbitrator under the Act, had to deal with three claims, all raising debatable points of interpretation or procedure. In the first case, the widow of a man who had been killed preferred the statutory claim upon the employers, which was met by the objection that the deceased had left a certain private estate, which negatived the idea of the wife being solely dependent upon his earnings. His Honour reserved his decision; observing that the matter was important. In the second case, action was taken for the recovery of an amount representing the man's wages for every day after the accident until his return to work. The employers offered an amount made up at the same rate of wages for every day after the first fortnight; but they raised the objection that the Court had no jurisdiction, inasmuch as the time allowed for the appointment of an arbitrator mutually had not expired. His Honour overruled the objection, upon the ground that, there being no mutual agreement to refer the claim, it was for the Court to deal with it. He gave judgment for the smaller amount tendered by the employer. In the last case, the man met with the accident while searching, after the dinner hour, for the fellow-workman with whom he was doing his appointed work of carrying planks. In the course of his search, he fell down a ship's hatchway. It was held that the accident did not arise out of the employment, because it was not part of the man's duty to seek for his mate off the scene of their joint labours. This decision strikes us as being both wise and strong.

WATER AND SANITARY AFFAIRS.

The scheme proposed by the Water Committee of the London County Council for dealing with the Water Question in the coming session is now before us. The Committee's first recommendation is that a Bill should be brought into Parliament for the purchase, by the Council, of the undertakings of the eight Metropolitan Water Companies; the sale to be compulsory, failing agreement. It is also proposed that a Bill (or Bills) shall at the same time be brought forward, by which the Council shall be empowered to bring an additional supply of water to London from the watersheds of the Wye and the Towy. The Usk section is for the present abandoned, and the Council is asked to rescind its resolution of a former date, by which it was decided to take up the Usk portion of the Welsh scheme in the first instance. With this change in view, there is a slight reduction in the estimated cost, which is now put at £16,546,000 for a daily supply of 200 million gallons. What are called "two main facts" are brought forward as justifying the proposals thus framed. It is alleged that one-quarter of the population of London has recently been subjected to a series of water famines by reason of the default of the East London Water Company. A second allegation is that the drought of the present year has reduced the flow of the Thames and the Lea to so low a state as to make it certain that these rivers cannot, in a dry year, yield the supply which the Royal Commission presided over by Lord Balfour of Burleigh relied upon in making their report. Whatever were the calculations of the Commission as to the flow of the Thames, the supply from that source has been found ample to meet the wants of the districts dependent upon it. As for the diminished flow over Teddington Weir, it is not clear that the quantity previously abstracted by the Companies has been duly allowed for. The figures always appear vague; and we suspect that the truth is somewhat disguised—the natural flow being much larger than the statistics suggest. At all events, the supply to the consumer has not failed. There may have been a reduced volume in the stream, for this has been the case with all the rivers in the kingdom, and the canals have been run inconveniently low. Concerning the other "fact" referred to—namely, that of "the "default of the East London Water Company"—such "default" as existed is being made good; and the Committee themselves admit that "it is possible, by tem- "porary measures, to satisfy the needs of East London "immediately." The Committee prove the depth of their conviction on this point by proposing that the undertakings of the Water Companies shall be vested in the Council within six months after the Bill has passed (price, of course, being an after-consideration); and that the Council shall forthwith proceed to connect the mains so as to "protect any part of the Metropolis from the "want of water." It is boldly asserted that "if the "Council's Bills of 1895 had become law, there would "have been no water famine in East London in the "present year." In other words, there was no want of water, but there was the want of an Act of Parliament—one which should unite all the undertakings, and place them in the hands of the County Council. But this union can be effected without the intervention of the Council; the sources of the supply remaining the same.

The terms on which the undertakings of the Water Companies are to be acquired, as set forth in the projected Bill,

are of the same inequitable nature which has characterized former attempts. The arbitration clause, though less openly unjust than it was in its pristine condition, is still a veiled menace. As for the outer areas, the question which they involve is declared to be "naturally one of "difficulty," and its ultimate settlement seems altogether remote; everything to remain in the meantime in the hands of the Council, as the party in possession. Into further detail we need not at present enter, as the Bills await the consideration of the Council a week hence. Beyond that, it has yet to be seen what kind of reception Parliament will give to an old friend with a slightly new face. The past can scarcely be said to encourage attempts to enter the sphere appropriated to the Water Companies. In the course of the recent debate in the County Council on the water supply of the Metropolis, it was stated by Dr. White that there had been seven attempts by seven different Governments to deal with the London Water Question, and all had ended in failure. The speaker accounted for the result by the fact that the question had always been made a party one. Certainly it was so in 1880, when it was made to serve as a lever for upsetting the Government of the day; a Select Committee, presided over by Sir William Harcourt, being afterwards able to report against the terms of purchase which had been provisionally arranged by Mr. E. J. Smith, such terms having formed part of the ill-fated Bill then brought forward by Mr. (now Viscount) Cross. Under the present Government, the Metropolitan Water Question again becomes prominent, and a Royal Commission has been appointed to inquire into the subject. Mr. Price-Williams, who was associated with Mr. Smith in working out some of the calculations for the scheme of purchase in 1880, has lately written to "The Times," and looking back, like Dr. White, mentions that the present Royal Commission is really the third of a series. Dwelling on the scheme of 1880, Mr. Price-Williams says that if the Bill had received the sanction of Parliament, and had the undertakings of the Companies been obtained on the terms proposed, the Metropolis by the end of 1892 would have been in possession of the undertakings free from every incumbrance as to deferred payments, and would also have enjoyed the benefit of a credit balance to the extent of £400,000. In short, Mr. Price-Williams contends that the estimates put forth by Mr. Smith have been fully justified by the event. There can be no doubt that the rejection of Mr. Cross's scheme was ill-advised, and was dictated by party spirit rather than by a calm consideration of the facts.

The storm is again brewing in the same fashion, except that party spirit now promotes a measure. The County Council is not disposed to wait for the Royal Commission, but proposes a Water Bill or two of its own in the coming session. As previously intimated, the Council need have two schemes—one for bringing in its pet supply from Wales, and one for settling terms with the Companies. But where are the "negotiations"? As for the Welsh supply, can we really consider its merits to be fully established? Are the rains always abundant on the Welsh mountains? Reports have reached us which show that while the drought prevailed in the Valley of the Thames, there was a very perceptible shrinkage in the rivers and streams of the Principality. River banks which should have been covered were laid bare and dry to an extent unremembered by the present generation. The Welsh supply, if ever it comes, should assuredly be held as "supplementary," for there would be evident danger in relying upon it wholly, especially as other towns intrude on the same area. But the need of going to Wales is open to serious question, if not to absolute denial. At the last sitting of the present Royal Commission, evidence of a very striking character was given by Mr. Reginald Middleton as to the abundance of water obtainable in the neighbourhood of the Metropolis. When the Commission resumes its sittings in the course of the coming month, the case of the Companies will be proceeded with; Mr. Middleton being the first of their witnesses. At this stage of the inquiry, the County Council sees fit to push its own scheme to the front, regardless of what may yet come to light in the proceedings of the Commission. But the evidence to be adduced is not likely to be ignored by Parliament or by the Government. The situation is at the present moment affected in the Council itself by opposition to be apprehended from the Earl of Onslow and the Moderates, directed against the report of the Committee.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 933.)

THE Stock Markets were more depressed last week than they have been for a very long time. The dominating factor was, of course, that which is called "the Fashoda incident." Everybody clings to the hope that war may be averted; but the way out of the difficulty is not very clear if both sides are firmly resolved not to give way. Business has naturally been very limited. There were few buyers about; and sellers had to be content with low prices whenever they pushed realizations. The weakness affected every department right through the list. Another influence to send things down was the condition of the Money Market, which is decidedly stringent. The monetary advance in France and Germany has tightened the pinch here; and the rates, both for short loans and for discount, have hardened considerably. It seems questionable whether the 4 per cent. rate will last till Christmas; but there is no likelihood of its going lower. The Gas Market last week was in an almost inanimate condition, most probably the result of the generally prevailing depression. The business done was of the smallest proportions—only a few transactions day by day just to save the market from absolute stagnation. Only two changes in quotation were made; and though both of them were in the downward direction, yet the general tendency was moderately firm. Each of the changes may be accounted for by special circumstances. Gaslight "A," after being steadily but very moderately dealt in at middle figures, receded a couple of points at the end of the week, when sensational rumours regarding a strike were set in motion. The secured issues were firm. South Metropolitan were quiet, and made no sign. Commercials were quite stagnant. The Suburban and Provincial group furnished their full proportion of what small business was done; all figures being steady and unchanged. The Continental contingent provided the other instance of a changed quotation, where further realizations of Imperial by those who fancied a safe hedge sent the quotation back five points. All the rest was destitute of any feature calling for remark. Business in Water was at a very low ebb all through the week; and the usually quiet day Saturday transacted pretty well as much as all the balance of the week. There were no changes in Water quotations.

The daily operations were not on a scale which calls for any detailed notice. Imperial Continental was rather freely offered at the opening, and dropped 3. From this point business just marked time, without any changes whatever being effected, until Saturday, when Imperial receded 2 more, and Gaslight "A" was put down 2.

ELECTRIC LIGHTING MEMORANDA.

Failures of the Electric Light—Is Electric Lighting Suitable for Steamships?—The London County Council and Electric Traction—The Cost of Arc Lighting in Edinburgh: A Correction.

IT was reported in Friday's newspapers that Brighton was "plunged into partial darkness" the previous night, owing to the failure of the electricity supply from the Corporation works. The incident furnishes another illustration of the continuing weakness of central station electric lighting, of which we cited some striking proofs last week. It is by no means our desire to make too much of this feature of the electric light; and we are quite aware that it will not prevent its extended use where people take to, and can afford it. At the same time, it is a feature that ought not to be overlooked, as will assuredly be the case if the electricians are left to report such occurrences. What we are mainly concerned to keep before the public, as users of artificial lights, is the simple fact that the elaborate and extensive electric light plants of the present day, notwithstanding their cost, are just as likely to fail at an awkward moment as their rough-and-ready prototypes. We remember quite well that when the first Edison incandescent electric lighting installation in this country, at the Crystal Palace, was being "inaugurated" in the usual festive manner, the toast of the evening, "Success to the Electric Light," had to be drunk by the primitive illumination afforded by a few candles procured in a hurry; the electric light itself having incontinently gone out. As it was then, it is still, and apparently ever will be. A peculiarly annoying element of these failures is due to the very favour which electric lighting receives from Local Authorities. When a municipality possess an electric lighting undertaking, they take good care to make the lighting as prominent as possible in the principal thoroughfares, the public buildings, and so on. There is no hiding of this light under a bushel—far from it. The consequence is that when the lamps go out accidentally, all the town knows it, and the maximum inconvenience is suffered.

When reverting to this subject last week, we could not know that another feature of electric lighting closely related to its unreliability would receive so terrible an illustration as was supplied when the "Mohegan" was lost on the Manacles reef. It is unnecessary to repeat here the awful tale of that ship-

wreck, when, for some unimaginable reason, a new liner, making her way down Channel on a dark but clear night, failed to pick up the Lizard lights, and ran ashore at a point twelve miles off her proper course. What is to be noted, however, is the circumstance that one of the first results of the vessel's striking was the going out of every electric light on board. This is a feature of ship lighting by electricity to which renewed attention will be called by the loss of life in the case of the "Mohegan," which was in all probability largely due to the fact of the ship being put in utter darkness at the supreme moment when the life and death of hundreds hung in the balance. For these many years past naval architects have treated the electric light as an indispensable necessary to a ship's equipment. Tier after tier of cabins and state-rooms, reached by means of corridors seemingly meant to reproduce the idea of a "maze," have only been made habitable by electric lighting. One's imagination fails to realize the situation created by such a catastrophe as the sudden extinction of every one of these lights, the instant after the sickening crash of collision or grounding has struck every soul on board with panic fright. How is anybody to find his way out of a great ocean steamship thus turned in a moment from an epitome of modern luxurious civilization into a darkened death-trap? The difficulty is to see how the evil is to be dealt with. Yet it seems impossible that ships can be permitted to go to sea with a lighting equipment which, however convenient so long as all goes well, is certain to fail in, and increase immeasurably the horror of, such a disaster as that which lately occurred to the ill-fated "Mohegan."

A week or so ago we discussed in this column the desire of the London United Tramways Company to obtain the consent of the County Council to an extension of the trolley-wire system of electric traction into the West Metropolitan district. It has now been decided by the Council to consent to application being made by the Company to the Board of Trade for power to introduce this system for the London terminal of one line of tramway, on condition that the Company do also, and on the same terms, introduce electric traction upon some underground system for the terminals of two other lines of tramway. The matter has naturally given the Highways Committee of the County Council a great deal of trouble; and one immediate result of the consideration of the subject by this Committee has been to strongly divide the members. It remains to be seen whether the Tramways Company will accept the conditional consent of the Council; but there is no other hope of the Council tolerating the trolley-wire system, even as an experiment. The Council are being urged from within and without to waive their objection to the overhead trolley-wire system. Examples of the successful use of the system are heaped upon them, so to speak; and over and above all they are conscious of the crying need for improving the tramway service in the suburbs. There is incessant clamour for "something to be done;" and against all this pressure the Council have only been able to raise the objection that the overhead trolley wire is a nuisance more than sufficiently serious to outweigh the possible advantages of electrical traction by this system. The opposition to the system is concentrated in the person of Mr. J. W. Benn, the Chairman of the Highways Committee, who cannot bring himself to see why London should put up with a system admitted to be imperfect, and at the very best only suitable for the outlying districts of the Metropolitan area. In the course of a few years, all the London tramways will come under the control of the Council, and the service will need to be largely extended, to relieve the congested central areas of the town. But it is from these central areas that the overhead trolley-wire system must be excluded; and Mr. Benn thinks that to permit it anywhere will operate as a bar to the introduction of a better system such as London could safely adopt. It is urged by some that electrical traction for tramways means the overhead trolley-wire system—there being no alternative. This is denied by Mr. J. Allen Barker, among others. Mr. Barker has made a report on the whole subject, which has been printed for the Council. We shall find another opportunity for doing justice to Mr. Barker's labours; but meanwhile it may be stated that he declares the choice between the overhead wire and underground conduit systems of distributing the electric power to be a question of relative expense only. If this is so, it is astonishing that our electrical contemporaries should recommend, as they do, the adoption of such a half-measure as the former system for London. We regard Mr. Benn's position as a strong one, and think the recent decision of the County Council eminently wise. The best of everything is not too good for London.

Referring to the statement in these "Memoranda" last week as to the cost of electric arc lighting in Edinburgh, a correspondent writes to point out that every alternate lamp is extinguished at 11.30 p.m., and consequently only burns half-time. If allowance were made for this ingenious way of economizing light by not using it, the cost of Edinburgh arc lighting would come out at £18 13s. 4d. per lamp per annum.

Gas-Engines for Driving Dynamos.—Gas-engines are to be used for driving the dynamos on the electric lighting plant at King's Lynn, for which Professor Henry Robinson is the Engineer. There will be five engines, each of 100-horse power, using producer gas as the working agent.

A FIFTY-TWO-AND-A-HALF HOURS WEEK.

An announcement of the very highest importance was published in last week's "Journal," in the letter of Mr. George Livesey headed "Extension of Workmen's Breakfast Time." It is not too much to say that the matter of this communication is of much greater interest for a large proportion of the working population of this country than the whole body of so-called "Labour" politics usually debated at Trade Union Congresses. Mr. Livesey states that four months ago the Directors of the South Metropolitan Gas Company decided, upon his suggestion, "to increase the breakfast time for all yard labourers and mechanics, and all other men except those engaged in the retort-houses, from half to three-quarters of an hour, of course, without reduction of pay." He is now able to report that he has "never known any concession to workmen give so much satisfaction." The assertion can easily be credited. Mr. Livesey remarked that he blames himself for never having thought before of the insufficiency of the traditional breakfast half hour to enable workmen to get a comfortable meal. In this expression of contrition, there is only the common human impulse of regret that a proved good thing has not been longer known. It is additional evidence of the strength of Mr. Livesey's conviction that an increased breakfast interval really meets a workman's need, and is one of those rarest of novelties—an unmixed good for all parties concerned. Like the "quality of mercy" described by the Poet of all Humanity, this boon is "twice blessed—it blesseth him that gives, and him that takes." We should be lacking in our duty to the gas industry and those who live by it, did we fail to give all possible prominence and publicity to this gracious act of the great Gas Engineer and true friend of labour who has already done so much for the working men of England. If Mr. Livesey had desired to make capital for himself out of the grant of this free gift to the South Metropolitan workmen, he would have brought the intimation before the general public as a communication to "The Times," or in an "inspired" paragraph transmitted through "the round of the newspapers." Nowadays, when so many people have brought the gentle art of self-advertisement to such perfection, it smacks of the manners of an older, more reticent Age to hear that an industrial reform of the first magnitude has been introduced without a flourish of trumpets in somebody's honour. Mr. Livesey, however, does not feel the temptation to pose on the pedestal of the popular press whenever he has done a wise and good deed. In the present instance, he communicates the fact through the channel by which he knows it will reach the special public for whose opinion he has a particular regard. We shall probably interpret his action in this respect most pointedly by suggesting that he would desire gas workers generally to be the first of British artisans to receive, by free gift from their employers and masters, this boon of a comfortable breakfast interval.

It is a great cause, and presents a fine opportunity which we hope gas managers throughout the United Kingdom will not be slow to make use of in the best interests both of capital and labour. If a National Party could win honour and power by virtue of adhesion to the cause of "A Free Breakfast-Table," surely employers of labour may attach a great deal of importance to the corollary of a reasonable allowance of time for the meal. It is one of those considerations which to the thoughtless appear to be trifles, but which the wise know to possess vast practical importance. A man of books and papers, an arm-chair philosopher, or a political economist of the college—a doctrinaire politician, or a journalist who never practised a handicraft, might fail to recognize the immense interest to workmen of the times allowed for meals. Nobody who has the very smallest personal acquaintance with the work-a-day world and the industrial population can underrate the importance of the subject. Not to labour the point, it is quite superfluous to seek proof for the conclusion that the extension of the breakfast interval from a half to three-quarters of an hour is to be esteemed as one of the most practical industrial reforms to be credited to the closing years of the century. It is obviously the first large concession that labour has received from the employer since the institution of the week of 54 hours. Henceforward the normal working week will be of 52½ hours.

The alteration will be noteworthy on several accounts. In the first place, it takes effect in the manner most closely touching the workman's personal and family rule of life. Thus it is clearly altogether different from a shortening of the working day at either end, by a later start or knocking off earlier. To shorten the working day by a quarter of an hour in either of these respects would be an unmitigated loss of so much productive time to the employer; while it may be doubted whether it would benefit the workmen in the smallest appreciable degree. By the actual way of it, as Mr. Livesey shows, the employer does not lose the whole time; while the workman gets it just when it does him and his family most good.

Secondly, the concession comes without asking (from the originators, at any rate), and is not influenced by Trade Union agitation, political clamour, or any other consideration besides that of the benefit derivable by both parties. For it would be folly to commend it as an act of philanthropy. If it were merely this, it would remain an isolated feature of a particular employment; whereas it is to be recommended for general

adoption as a paying thing to do. It assists the workman, and is directly by way of rendering him a more comfortable, healthy, and efficient man. What Mr. Livesey can afford to do for the South Metropolitan workmen, can be done everywhere. It is, moreover, on the one hand a clear-cut, plain, and simple point of industrial economy such as every works manager can reason out for himself; and it is, on the other, a boon which the most captious workman must appreciate, even though he appear to be thankless. At all events, if the most cantankerous "sea lawyer" of them all will not thank his employer for the addition to his ease, he will not be required to thank anybody else than Mr. Livesey for originating the idea. Unlike the much-discussed Eight-Hour Day, there is no *pseudo*-physiology or sheer fancifulness about this reform. Nobody has taken it up, or made a "cry" of it, so that the practice stands upon its own merits, which are obvious.

It may be objected that the Eight-Hour Day, or forty-eight hour week, is equally confessed to be a paying system by some employers, so that if the experience of one is to govern the rest, the A.S.E. ought not to have come to grief over their attempt to impose this as the rule for the London district. It should hardly be necessary to argue that the two things are wholly different. There is such a mass of contradictory and irrelevant contention surrounding the central idea of the Eight-Hour Day, that it is almost impossible for a man of business, who does not wish to have anything to do with politicians in business matters, to know what to believe about it. Such a person is confronted at the outset with the irreconcilability of the two grounds upon which the case for an eight-hour day is based by the labour agitators who clamoured for it, and the few employers who have adopted it. The former argued for an eight-hour legal day as a means of absorbing the unemployed; for the reason that it would necessitate the engagement of more men to do a certain amount of work. They made no fetish of this particular length of the working day, but declared that if it did not turn out to their satisfaction as an absorbent of disposable labour, they would proceed to agitate for a seven or a five hour legal day, until the *desideratum* was achieved. When it came to pressing the point upon employers, however, this argument was left out; and it was contended that men would be found to do as much in eight hours as in nine. Physiology was invoked to show that nobody ought to work longer hours; and the claims of the workman to more leisure, to be devoted to the means of self-improvement and the higher culture, were pushed for all they were worth—from the political point of view. Those employers who adopted the system, and have found it to answer, justify themselves on the second ground of the foregoing category—that their men actually do as much in the week under the system; or that it answers their purpose in some other way.

The question raised by the last observation, as to what system of working is most expedient in the interest of the workman, or the master, or of both, is a very wide and deep one, not to be answered by referring to a particular employment, or any single industry. It goes so deeply into the very foundations of industrial and general society, that different nations and communities may be expected to supply different answers to it. Practically, the choice in England between the eight-hour day and the day of nine or more hours, resolves itself into a question of working some time before breakfast, or of having breakfast before getting to work. On the continent of Europe, and in America, the case is different. Widely divergent as the Continental and American social divisions of the day are in some respects, they agree in starting work at 7 a.m., and going on without a break until noon. Re-starting at 1 o'clock, they would go on until 6 p.m.—thus making the ten-hour day, which is the minimum. Sometimes work is started earlier, and ends later. The British workman has been bred to a different order of the day. Starting at 6 a.m., he works a "quarter" before breakfast, for which meal he has invariably been allowed half an hour. Bricklayers and navvies begin their dinner hour at 12, mechanics at 1 o'clock. Working 9½ hours for five days of the week, they all get done by their respective dinner times on Saturday—thus making a 54-hour week. If the eight-hour day is substituted, this means the abolition of the breakfast interval. From the employers' point of view, this is not altogether a bad idea. They say that men coming in "cold, sleepy, and hungry" at 6 o'clock only work in a half-hearted way until breakfast time, in anticipation of which they begin to get ready to go out ten minutes or so before the bell rings. The influence shows itself patently in the case of piece-workers by hand, who are prone to lose the first "quarter," and make up afterwards for lost time. Attention has been recently drawn once more to this aspect of the question by the reported experience of Messrs. Short Brothers, of Pallion. This firm of shipbuilders and engineers adopted the eight-hour day seven years ago, chiefly owing to the difficulty of getting the men in for the first "quarter;" and they have found that under the new system the actual time worked per man per annum is more than with the old system—the output of the works being correspondingly improved. Here is an example which may be employed to illustrate the bearings of the whole question. It certainly does not completely answer it in any sense.

The hour of starting work is chiefly a matter of habit, when it is not a matter of climate or of race, and of social or industrial necessity. Where the man lives near his job, it is no hardship in the English climate for him to turn out and do a good spell of work before breakfast. No healthy, able-bodied man of sober habits is either cold, sleepy, or hungry at 6 o'clock in the morning. Having done his "quarter"—as smartly as any other spell for the day—he is ready for his breakfast. Meanwhile, the wife has had time to prepare the meal; and the children are also ready for breakfast and school. The workman and his family can partake of the first meal of the day together. Supposing the workman to be so circumstanced as to have to travel to his work by rail or tramcar. A regular service is provided, landing him on his job betimes. Again, after working his "quarter," he has the breakfast interval for his first meal, to be partaken of in company with his mates; the family being left at home. Where is the benefit of requiring the man to take his breakfast before starting work (say) at 7 a.m., with the certainty of getting no interval before noon, or later? If the home is near the job, the hour is too early for the wife and children to have their breakfast. If the job has to be reached by rail or tram, in all probability the man has to start just, or very nearly, as early as if his work began at 6; and he must snatch a "bite" before leaving home—which is too soon—or after he arrives, when there is no convenience for it. The whole thing is out of joint.

Therefore, every consideration points to the advantage of the South Metropolitan reform. The strike in the engineering trade would have been stopped amid a chorus of self-gratulation on the part of the agitators if the employers had offered such a concession to the forces of revolt. Indeed, the members of the A.S.E. were actually balloted once, to ascertain whether they would return to work upon this system, although the Federated Employers had previously declined to countenance any disturbance of the working hours. Things are different now; and in the present state of most trades a concession of the character of that which forms the subject of this article could generally be spared, and would be an unmixed good to the recipients.

THE GAS ACTS OF 1898.

(*Concluded from p.* 864)

The following Acts obtained last session by Local Authorities already possessing gas undertakings contain clauses referring to gas supply:—

The Coventry Corporation Gas Act extends the limits of supply to include the parish of Exhall. Additional gas lands are to be acquired compulsorily within three years. Certain footpaths are to be stopped up, and others substituted for them. Power is taken to construct railway sidings and canal lay-byes. Gas of 15-candle power is to be supplied, tested on the works. The period of error in consumers' defective meters is limited to the last preceding quarter. The price of gas in the parish of Foleshill is to be the same as that charged within the city. Certain provisions for the protection of the London and North-Western Railway Company are inserted. A new gas loan of £250,000 is authorized, repayable in forty years. It is provided that the repayment may be either by equal yearly or half-yearly instalments of principal, or of principal and interest combined, or by means of a sinking fund. In the latter case, the sinking fund may be formed by equal annual payments throughout the prescribed period altogether amounting to the capital sum. This is called a non-accumulating sinking fund. Or there may be paid to the fund throughout the prescribed period such equal annual sums as, with the accumulation of interest at a rate not exceeding 3 per cent., will make up the required amount. This is called an accumulating sinking fund. All sinking fund payments, and the interest thereon, unless applied in repayment of the loan, are to be immediately invested in authorized trust securities, or in municipal securities (not being annuity certificates or securities payable to bearer) duly issued by any other Corporation in Great Britain. It is provided that a reserve fund equal to one-fifth of the aggregate capital expenditure upon the undertaking may be formed out of the gas profits.

The Edinburgh and Leith Corporations Gas Act authorizes the Gas Commissioners to acquire new gas lands and erect works at Granton, to be completed within twelve years. An additional gas loan of £400,000 is sanctioned. The Commissioners may borrow money temporarily from their own sinking funds. Gas-fittings in any new house or building are made subject to inspection on behalf of the Commissioners, who have an absolute power of discretion as to refusing a supply of gas where the fittings are not to their reasonable satisfaction. Tenants of houses are made responsible for the gas-rental of a sub-tenant for any period not exceeding two months.

The Halifax Corporation Act contains a part relating to gas. Additional gas lands are sanctioned. Power of inspecting new internal gas-fittings is given. A new gas loan of £150,000 is to be raised, repayable in forty years. The financial clauses are similar to those in the Coventry Act.

The Ilkeston Corporation Act sanctions the supply and fixing of gas-fittings by the Corporation, and enacts other miscellaneous provisions now commonly found in modern Gas Acts. The sum of £5000 may be borrowed for gas purposes, repayable in thirty years. The accounts relating to the Corporation gas and water undertakings are to be separated.

The Middlesbrough Corporation Gas Act enables the Corporation to acquire additional gas lands, stopping up a street at the same time. Power is given to exchange certain lands. A new gas loan of £150,000 is authorized. Gas of 15-candle power

is to be supplied. Proceedings for the recovery of any demand not exceeding £50 may be taken in the County Court.

The St. Helens Corporation Act contains a part relating to gas. Power is given for the establishment of a gas reserve fund amounting to £25,000. The Corporation may make bye-laws as to gas service-pipes and fittings. Provisions are made with respect to Corporation employees' superannuation.

THE WATER ACTS OF 1898.

The following Acts of Parliament relating to water supply were passed during the last session:—

The Clacton-on-Sea Gas and Water Act incorporates a Company for the purpose of supplying Water in the urban district of Clacton, Essex. Existing water-works, the property of a Limited Company, are to be utilized; and extensions are authorized, including a well and pumping-station to be situated in the parish of Great Bentley. Upon the construction of this work, the Tendring Rural District Council may demand a supply of water in bulk, to be paid for at the rate of 1s. per 1000 gallons. The powers of the Company for the compulsory purchase of land are to cease after the expiration of five years. Rates for domestic supplies are set out in detail, with 5½ per cent. as the minimum charge for premises of £100 a year gross estimated rental and upwards. Water may be supplied by measure for other than domestic purposes. A part of the Act provides for the transfer of the undertaking to the Urban District Council, in accordance with the terms of a scheduled agreement. The money to be borrowed for this purpose is repayable in sixty years.

The Crawley and District Water Act incorporates a Company for the purpose of supplying water to a district of Sussex at present inadequately served in this respect. The capital of the Company is £30,000, with the usual proportion of loan. The Act is to be carried into effect within four years. The authorized works comprise a well and pumping-station to be situated in Ifield parish, to be completed within five years. The rate for domestic supplies is to be 7½ per cent. on the rateable value. Half-rates are leviable upon empty houses. A high-level service is to be chargeable with 25 per cent. extra; and all inns are to be charged 9 per cent. Prices are stated for other than domestic supplies. The charges for public institutions may be settled by arbitration.

The Mid-Kent Water Act dissolves and re-incorporates with statutory powers a Company formed in 1888 for the purpose of supplying water in a certain part of Kent. The Company's powers are to expire in six years unless effectively exercised. The capital of the Company is £120,000, whereof £33,000 is the original capital, and upon this the Company may borrow £8000, and the usual proportion of the additional capital. The works authorized to be carried out comprise a well and pumping-station in the parish of Halling, and a reservoir in the parish of Birling. The Company are not to interfere with the Tottington spring, in Aylesford parish. Clauses are inserted for the protection of the Maidstone Rural District Council. The works are to be completed within five years. The Maidstone Water-Works Company are protected. Rates for domestic supplies range from 7½ to 6 per cent. upon the rateable value. Water may be supplied by meter, at a minimum charge of £4 per annum. Portions of the South Kent Water Act, 1889, are repealed.

The Newhaven and Seaford Water Act dissolves and re-incorporates a Limited Company, who have obtained several Provisional Orders. The capital of the statutory Company is £50,000, whereof £30,000 is original capital, to be converted into stock. The borrowing powers are as usual. New water-works are authorized. Consumers' meters and fittings that have been unused for 48 hours may be removed. In the event of the undertaking being purchased by the Urban District Councils of Newhaven and Seaford, the price is not to be enhanced by the fact of the passing of the Act.

The North Warwickshire Water Act incorporates a Company for the supply of water to the parish of Foleshill and the neighbourhood. The Act must be carried out within eighteen months for a portion of the district, and three years for the remainder. The Corporation of Coventry are protected by the grant of purchasing powers, to be exercised only in the event of the city boundaries being enlarged to include part of the Company's district. The capital of the Company is £36,000, with the usual borrowing powers. The water-works comprise a well and pumping-station in the parish of Corley, and another in the parish of Keresley. The works are to be completed within seven years. Domestic rates range from 8 to 7 per cent., with 9 per cent. for inns. Owners of three or more houses may compound at a discount of 10 per cent. Water-rates for property held on weekly or monthly tenancy are payable by the owner.

The Rhymney and Aber Valleys Gas and Water Act incorporates a Company with £200,000 of water capital and the usual borrowing powers. The undertaking of the Rhymney Valley Gas and Water Company is to be acquired; as is also the water undertaking of the Rhymney Iron Company. An agreement for the purchase of the Caerphilly Gaslight and Coke and Water-Works Company is confirmed. The Company have the option of purchasing the undertaking of the New Tredegar Gas and Water Company, Limited. Additional water-works are authorized, including a new reservoir in the parish of Gelligaer, to be formed by impounding the Nant Pitgwellt Brook. The water of the Rhymney River may also be taken when the flow exceeds 25,000 gallons per day, subject to compensation. The works are to be completed within seven years. Rates for domestic supplies are to range from 10 to 7 per cent. on the rateable value. Water supplied for domestic purposes is not to be used as a source of power. Meter supplies are to be chargeable at the rate of 1s. 6d. per 1000 gallons. Agreements with several Local Authorities are scheduled and confirmed. The period limited by the Rhymney Valley Gas and Water Act, 1892, for the construction and completion of the water-works thereby authorized, as extended by an Act of 1897, is further extended for a period of two years.

The Sheringham Gas and Water Act incorporates a Company already established for the supply of water in the parishes of Sheringham and Beeston Regis, in Norfolk. The capital of the Company includes £6000 original water stock, and £12,000 additional water stock, with the usual borrowing powers.

The Wey Valley, Frimley, and Farnham Water Act incorporates a Company with a capital of £30,000 and the usual borrowing powers. The water-works include wells and pumping-stations in the parishes of Crondall and Frensham. The Company are not to take without the consent of the Conservators any water that might find its way into the River Thames. Various other interests are protected. The works are to be completed within five years. Rates for domestic supplies range from 9 to 6 per cent. upon the rateable value. Charges for public institutions are to be settled by a County Court Judge. Fittings may be removed from houses unoccupied for three months. The limits of supply by the Frimley Company are extended, and the capital of the Company is increased by £15,000. Certain proceedings of the Company are legalized. The limits of supply of the Farnham Company are enlarged; and the capital of the Company is increased by £5000. Certain agreements between different Companies in the district are authorized.

PERSONAL.

Mr. A. T. Osman, of Oxford, son of the Manager of the Wimborne Minster Gas-Works, has been appointed foreman of the Distributing Department of the Torquay Gas Company, applications for which position were invited in the "Journal" for the 13th ult.

A short time ago the German Emperor sent, through the German Ambassador in Copenhagen, to Mr. F. D. Marshall, Engineer of the Danish Gas Company, a signed photograph of himself, accompanied by a letter asking Mr. Marshall to accept the photograph in memory of pleasant times spent at Kiel together.

The Committee of the Royal Scottish Society of Arts recommend that Keith complimentary silver medals should be presented to Professor W. Ivison Macadam, of Edinburgh, for a communication on "Carburetted Water Gas," and also to Mr. D. Bruce Peebles, of Tay Works, Edinburgh, for a communication entitled "Acetylene Gas, and a Simple Generator for its Production."

OBITUARY.

Mr. C. Palmer, who was for many years Chairman of the Swaffham Water Company, has just died at the advanced age of 92.

We regret to announce the death, last Wednesday, at Cromartie House, Ventnor, of Mr. John Gillett Livesay, A.R.I.B.A. In 1858, Mr. Livesay's father acquired the Ventnor Gas and Water Works. It was then that he came prominently before the town; and after the present Company was formed, he was appointed Secretary. In 1866, he became Surveyor to the newly-formed Local Board; and the general system of sewerage was carried out under his superintendence. Early in the seventies, however, he relinquished the position. For upwards of twenty years he had been a Director of the Company; and he was on the Board of several other companies, local and otherwise. In former years he had a large practice as an architect and surveyor. Deceased was in his 59th year; and his death was the result of a long illness.

Midland Association of Gas Managers.—The autumn general meeting of this Association will be held next Thursday, at the Grand Hotel, Birmingham, under the presidency of Mr. J. T. Lewis, of Wellingborough. We learn from the programme issued by the Hon. Secretary (Mr. C. Meiklejohn, of Rugby) that Mr. W. S. M'Gregor will read a paper describing the reconstruction of the gas-works of the Longton Corporation, which, as recorded in another part of the "Journal," has been carried out under his supervision. In the afternoon, brakes will be in waiting to convey the members to the Saltley Gas-Works, where, by the kind permission of the Gas Committee of the Corporation of Birmingham, they will have the opportunity of inspecting the important extensions completed and in course of construction, to the designs of Mr. Hack, the Engineer. He will receive the members at Saltley, and conduct them over the works, described in the "Journal" last week. After the inspection, light refreshments will be provided by Mr. Hack.

NOTES.

Effect of Carbon Dioxide on the Flame of Acetylene Gas.

At the recent meeting of the British Association, Professor Emerson Reynolds performed an interesting experiment illustrating the effect on an acetylene flame of varying proportions of carbon dioxide in the gas. It was the result of a chance observation by Mr. Goodwin, who conducted a series of tests in Philadelphia on the enrichment value of acetylene when added to ordinary coal gas. He stated that expired air when mixed with acetylene appeared to increase the luminosity of the flame, and also to decrease the tendency to deposit carbon in the burners. More careful study, however, had shown that from 5 to 8 per cent. of carbon dioxide in the gas decreased the smokiness of the flame, and especially prevented the clogging of the burners. The increase in illuminating power was certainly not marked; but the mixture containing 5 per cent. of carbon dioxide gave as much light as the acetylene itself, and therefore there was a gain to this extent per volume of acetylene burned. The action of the carbon dioxide was regarded as probably due to its exerting some oxidizing effect.

Creosote still the Best Timber Preservative.

In a paper read by Mr. Charles H. Snow before the American Society of Engineers, various methods of protecting wooden piles from marine boring animals were described and criticized. Paints, verdegris, paraffin, tar, asphalt, and other exterior coatings have been used with this object; but it is usually difficult to retain such coatings in position. The conclusion drawn by the author is that of all the substances and devices suggested as substitutes for creosote, none can really compare with it. Creosote still supplies the best means for repelling the attacks of the teredo, limnoria, and other sea animals, and also the termite and other land woodborers. It is observed that the word creosote has not an absolutely exact definition. The substance has no chemical symbol, and it designates a fluid the constituents of which constantly differ. It is essential that creosote should be heavier than water, as light creosotes have never been satisfactory, and most of the failures attributed to creosote have really been due to the use of such oils. Creosote is expected to act in two ways. It introduces antiseptics into the wood; and also fills the pores with thick, gummy insoluble oils and naphthalene. The United States cannot meet the demand for dead oil of coal tar, and a large quantity is imported from England. The so-called "London oil" is very thick and heavy, and is regarded as one of the best grades of creosote for marine work. After procuring the proper grade of creosote, the next condition of success is the thorough application of it in sufficient quantity, and the selection of a suitable kind of wood.

Slag Fire-Bricks.

According to a recently issued German report, slag bricks possess important advantages for high temperature work. At first bricks were made in Germany from solid slag; but these did not prove satisfactory, being of the physical nature of glass. It was recognized that a certain degree of permeability is desirable in a brick; and accordingly slag bricks are now manufactured from slag that has been granulated in water. The granulated material is made binding by the addition of lime, with which ground slag is mixed when a specially dense and strong brick is desired. Slag bricks are not burnt in the process of manufacture; being simply moulded and hardened by drying. They are about as strong as common bricks. The resistance of slag bricks to high temperatures is stated to be quite remarkable. Heated to a pale red, when the carbonate of lime begins to decompose, the strength of the brick is not impaired. Even if a part of the lime should be burnt to the caustic state at such a high temperature, carbonic acid is again absorbed at a lower temperature and the brick becomes as strong as before. In testing whether slag bricks have dried and hardened sufficiently for use, a small sample tied to a string is dipped into a cold, concentrated solution of sulphate of soda, and hung up in the dry. By the evaporation of the water of the solution and the crystallization of soda, which in its action resembles the formation of ice, those samples of brick which would not be weather-proof are destroyed. Not merely slag bricks, but any other can be tested for frost-resisting quality in the same way. The slag bricks should be very cheap.

Railway Carriage Lighting by Acetylene Gas.

Acetylene gas for railway carriage lighting has been in use for some time on the Pontiac Pacific Junction Railway in Canada. In answer to a request by Colonel J. H. Western, the Inspecting Engineer of the Egyptian Government Railways, for some information concerning the use of this gas, Mr. P. W. Resseman, the General Superintendent of the former railway, states that he has used it for nine months, and that there is really no comparison between the effectiveness of acetylene gas and coal oil for car lighting. With coal oil at 14c. per gallon, and carbide at 5c. per pound, the cost of acetylene gas for car lighting is somewhat less than the same lighting by coal oil. In Canada, however, owing to the severe frost in winter, they have to place the generators inside the cars to prevent them from freezing. The disadvantage of this lies in the fact that acetylene gas is most difficult to control, and the slightest leak in the generator causes a disagreeable smell in the car. It is found that an ordinary passenger coach, previously lighted by fourteen coal oil burners, can be brilliantly lighted with five 25-candle power acetylene burners, consuming each ½ cubic foot per hour. The carbide supplies 5 cubic feet of gas per pound; making the total cost of the lights 2c. per hour, or for a run of four hours 20c. to 21c. per car. The gas is generated in small quantities, confined beneath a 7-inch column of water; and any that may escape is so speedily diffused in the surrounding atmosphere that its explosive nature is at once neutralized. In the event of a car turning over, the lights go out immediately; and the gas escapes so quickly that fire cannot affect it.

A Large Steam Heating and Ventilating Plant.

One of the largest steam heating and ventilating plants in existence is reported to be that recently installed for the new buildings of the Colombia University. The whole of these structures are provided with a sufficiency of direct steam radiators to overcome the loss of heat through walls, windows, and roofs; and the fresh air required for ventilation is blown over stacks of heating pipes. Everything is calculated upon the customary American standard of heating efficiency—the maintenance of an indoor temperature of 70° Fahr. when the thermometer is at zero outside. The University buildings have a total content of about 9,700,000 cubic feet; the heating surface of the direct steam radiators amounts to 56,000 square feet; and the ventilating system is designed to furnish about 50,000,000 cubic feet of warmed air per hour. When the outside air is at zero, the steam consumption of the whole plant is computed to be as follows: Condensation in the direct-heating radiators, 560-horse power; condensation in the air-heating stacks in connection with the blowers, 2205-horse power; power required for driving the electric motors for the fans, 635-horse power. Thus it appears that to warm and distribute the fresh air for ventilation takes about six times as much fuel as is required to simply maintain the inside temperature of the buildings. Mr. G. A. Suter designed the plant, and calculated the dimensions from the following data determined by experience. One-horse power of steam serves 100 square feet of direct radiating surface. One-horse power of steam in air-warming pipes heats 20,000 cubic feet of air from zero to 70° Fahr. One-horse power on the shaft of an electric motor driving a blower will move 75,000 cubic feet of air in and out of the rooms. All the exhaust steam of the engines is utilized in the service.

TECHNICAL RECORD.

THE DEVELOPMENT AND EXTENSION OF THE LEEDS GAS UNDERTAKING.

One of the most interesting studies in the development of a municipal gas undertaking is furnished by that at Leeds. Of all the boroughs in the country, there is not one, within our knowledge, in which municipal action has been governed so much by party feeling as in that city. In the counsels of the Gas Committee it was at one time the dominant factor; and it had a serious and detrimental influence on the gas undertaking. But about three years ago, there was a change in administration; the Conservative party becoming the ascendant power. Then a Gas Committee, constituted of both parties, was formed, the members of which showed their wisdom by determining at the outset to sink all party differences in working for the retrieval of the fortunes of the undertaking of which they were given charge. The result of their enlightened policy is shown by the present financial position and productive strength of the concern. At the head of this Committee is Mr. Joseph Lowden; his deputy is Alderman Matthew Walker; among the members is the Lord Mayor (Alderman C. F. Tetley); and the General Manager of the department is Mr. R. H. Townsley. Then the General Committee (consisting of twenty-one members) is divided into five Sub-Committees. There is the Audit, Meters, and Mains Committee, of which Alderman Walker is the Chairman; the Meadow Lane Works Committee, with Mr. Francis Ambler as Chairman; the New Wortley Works Committee, with Mr. Philip Heaton as Chairman; the York Street Works Committee, with Dr. B. G. Heald as Chairman; and the Workshops Committee, with Mr. Henry Scholefield as Chairman. On Monday of last week, we were afforded an opportunity of inspecting the work which these gentlemen and their colleagues have accomplished in developing the undertaking and business; and we feel assured that, from the Chairman down to the lowest official of the department, one and all are animated by a fervent desire to do all they can to promote the best interests of the ratepayers. They have had a difficult task before them; and they have faced it boldly.

The Beneficial Results of the Committee's Labours.

Before describing what has been done in the way of improving and extending the works, it may be interesting to call attention to the benefits which have ensued from the reformation of the department. We must not omit to state that in this reformation not by any means the least important change has been the adoption of a superior system of management to that which existed for several years after Mr. Henry Woodall severed his connection with the undertaking. Now there is a competent Manager

at each station, with a central authority, as already stated, in the person of Mr. Townsley. The Station Managers are: Mr. George Tooley, Meadow Lane; Mr. John Bond, New Wortley; and Mr. W. E. Pettigrew, York Street. To proceed, nothing more than the following figures can be required to prove the wisdom of the policy inaugurated by the present administration, and which policy, if not interrupted by a change in the supremacy of parties, should lead to even better results. We are informed that the surplus profits for the year ending March, 1895, were £33,718; 1896, £26,493; 1897, £7133; and 1898, £12,232. The last two years show a considerable fall; but this is easily accounted for. In the first place, the price of gas since then has been reduced by 2d. per 1000 cubic feet; and as 1d. reduction represents a gift to the consumers of £10,500, the 2d. is equal to £21,000. Then meter-rents have been abolished; and this reduced the revenue of the department by about £12,000 per annum. In addition, £27,000 has been handed over to the borough fund in aid of the rates. Crowning all this is a particularly pleasing feature—that in March last the Committee possessed a reserve fund amounting to £31,258; while, when they took office, there was an accumulated deficit of something like £33,000. Another reduction of 2d. per 1000 cubic feet (representing a further £21,000 for the consumers) will come into force on Jan. 1 next; and the price will then be 2s., less 5 per cent. discount, if the account is paid within one month of delivery, or 2½ per cent. if paid within the second month after delivery. Taking into consideration that there is no charge for meter-rents, the discount, and the quality of the gas (above 18 candles), the consumers have certainly nothing to complain of in respect of this price; and when production is cheapened by the introduction of additional improved plant, the charge will in all probability be further lessened. In the out-districts the price is also to be reduced by 2d. to 2s. 10d.; but the difference of 10d. causes some little dissatisfaction to the outside consumers. When, however, it is pointed out that the amount of gas sold outside the city boundary is only ¼ per cent. of the total consumption, or in all about 6 millions a year, it will be seen that the difference is not an unfair one. The introduction of prepayment meters by the Committee has also been very successful; and their use has greatly extended since they were supplied in conjunction with penny-in-the-slot cookers, of which within the last few months 300 have been fixed. The Committee furnish and fit the cookers free, and give 30 cubic feet of gas for a penny; but for lighting purposes 33 cubic feet are supplied.

By way of further showing the progress of the department, it may be pointed out that the quantity of gas manufactured in the year ended June 30 last was 2,849,233,000 cubic feet, as compared with 2,411,931,000 cubic feet in 1891; while the quantity sold was 2,530,952,500 cubic feet, as against 2,102,319,500 cubic feet. Still the increase is continuing at a remarkable rate. In July last, there was an increase of 6 per cent. in the quantity of gas made compared with the corresponding month of last year; in August, 14¼ per cent.; and in September, 10 per cent. This is extraordinary considering the warm, bright weather experienced during those months. The quantity of gas sold per ton during the six months ending July was greater by 500 feet than at any other time in the history of the undertaking. All these figures speak volumes for the efficiency of the present management. Other figures for the year are also interesting. The quantity of cannel and coal used was 281,200 tons; the total number of meters in use was 89,214, as compared with 58,700 in 1871, 67,400 in 1881, and 82,195 in 1891; the number of prepayment meters was 3200; gas-engines, 805; gas-stoves, 2889, as against 1105 in 1891; and the length of gas-mains was 772 miles, as against 700 in 1891. The lighting area of the city is about 13 square miles. The distribution system covers one of the most extensive areas, if not the most extensive, of any undertaking outside London; and the mains run into some very straggling districts. The leakage is about 9 per cent., which, considering the nature of the district, is not regarded as excessive. The present capacity of the whole of the Corporation Gas-Works (including the additions) is about 17¼ million cubic feet per day, or 2¾ millions more than in 1891.

In addition to the uphill work which the Committee have had to face in connection with their work of reformation, they have had to keep a watchful eye on the illuminating power and quality of the gas—it being subjected to a most rigorous system of testing. The gas is tested both at the works and gasholder stations (situated 2 or 3 miles from the works) by the Magistrates' Inspector, without restriction as to hours. It is also tested by the City Analyst in the centre of the town; and by the Chemists of the Gas Department, who are entirely independent of the Station Managers. The standard illuminating power is 18 candles; and the average return for the year ended June 30 last was 18·25 candles. The sulphur impurity in the gas has been reduced from 16·36 grains per 100 cubic feet in 1891 to 14·85 grains per 100 cubic feet in the year 1897-8. The satisfaction which the Gas Committee are giving the Gas Justices in respect to the quality of the gas is shown by a letter which Mr. Lowden received from the Chairman of that body (Mr. Spark) on Monday of last week. He stated that the Justices were pleased with the manner in which the Committee were maintaining the quality of the gas, and that for a long time they had no reason for complaint on this ground.

In conjunction with the extension and improvement of the works, to which we are about to refer, the Committee have given consideration to the claims of the men. In 1892 only the stokers, firemen, and coal wheelers had an eight hours' working day conceded; but now every man employed inside the works enjoys that privilege.

The Extension of the Meadow Lane Works.

Turning now to the extension of the works, we may preface the description of the new plant by mentioning that, although £120,000 has been spent during the past three years, it is intended to continue the present policy of modernizing the works as opportunity offers. Taking the Meadow Lane Works first, these cover an area of rather more than 5 acres. Since they were purchased from the Leeds New Gas Company they have practically been reconstructed, and are now capable of producing about 7½ million feet of gas per day. One illustration of the effect of the improvements is afforded by the make per mouthpiece. Five or six years ago it was only a little more than 5000 cubic feet; and now, even with the old plant, the yield is 7000 cubic feet. In 1895, a Sub-Committee was appointed to inquire into new methods of carbonizing; and, after much investigation, they recommended the General Committee to adopt at these works the automatic inclined retort system. This recommendation met with the approval of the Committee and the Council; and, in October of 1896, the plans of the late firm of Messrs. Little and Graham, Limited (since reconstituted as the New Conveyor Company, Limited) were adopted for the installation of the system, at an approximate cost of £22,813. There has also been an expenditure of some £12,000 or £13,000 in connection with a new retort-house. As it was anticipated that, with this additional retort-house, the make of gas would be increased by nearly 2¾ million cubic feet per day, it became necessary to extend the purifying plant, and to erect a new set of exhausters, a couple of purifying-machines, three sets of new condensers, and a station meter, with a capacity of 100,000 cubic feet per hour, as well as to enlarge the whole of the mains both above and below ground. The new purifying-house, which is being constructed on the stage-floor plan, will certainly be a very fine one. The ironwork is being supplied by Messrs. Clayton, Son, and Co. The purifiers, eight in number, measure 30 ft. by 20 ft.; and they are fitted with Weck's valves. An elevator is being erected for the raising of the purifying material. Altogether, above £12,000 has been spent on this house. Another important feature has been the erection of a shed in which to store coal for use in the event of an emergency. This shed is 406 feet long by 70 feet wide, with a storage capacity of 15,000 tons. The process of filling is now taking place. There is also on the works a small experimental gas plant, at which tests are made almost daily of the coals as they are delivered, with the object of ascertaining whether, during the whole period of contract, the delivery is equal to sample.

The Inclined Retort House.

The inclined retort installation has, like many of the other improvements of the last few years, been carried out by Mr. Townsley's advice, and under his direct supervision. Throughout it is an admirable example of work of its kind; and all who have been concerned in its erection, from Mr. Townsley and the New Conveyor Company down to the workmen, may well be proud of the completed structure. It has a semi-circular roof of 100 feet span and 60 feet from the ground level to the underside of the principal. In the centre of the building and on one side a roofed superstructure is built out to cover the higher portion of the conveying plant. The plant consists of two double sets of benches arranged back to back, each bench containing 49 retorts (seven settings of sevens), or a total of 196 retorts. The dimensions of the retorts (which are ⏢ shaped) are 24 in. by 15 in. at the bottom, tapering to 20 in. by 15 in. at the top, 20 feet long, and set at an angle of 32°. The retorts are in specially designed settings, with regenerative furnaces below; the furnace being charged by an improved design of shoot from one or other of the top retorts, and the clinkering operation being performed on the ground level. The heats obtained with these furnaces are certainly magnificent. There are two chimneys, one for each of the two benches of retorts; and the dampers are arranged in special flues, so that both benches can be worked together or separately as desired.

The charging-stage for all four sets of benches runs down the centre of the house, and is 24 feet wide. The drawing-stages are on either side of the building, and are 21 feet wide. These run the entire length of the house; and the plates on both of them are chequered to give a good foothold, and also ample ventilation. Overhead are four steel storage hoppers, each having a capacity of about 70 tons. A gangway is fitted on the side of each set of hoppers, so that the men can have easy access to the push-plate conveyors and the hoppers themselves. There are three steel measuring chambers to every bed of retorts, each one being 5 ft. 8 in. deep, 1 ft. 6 in. wide, and 3 ft. 6 in. long, and holding a charge of 7 cwt. Inside is fixed an adjustable baffle-door, allowing the measuring of a small or large charge as required. The charging-shoots, which run along a steel railway in front of the benches, are of the latest design, with checks and baffles to regulate the flow of the coal into the retort, and so secure an even charge.

The automatic machinery for filling the overhead hoppers is made entirely in duplicate, and is arranged so that either plant can feed the whole of the hoppers. It consists of two coal-crushers of a powerful description, and two elevators, with

buckets 20 inches wide, to raise the coal into the push-plate conveyor, which runs transversely across the centre of the house. There are two horizontal steam-engines and gearing, the whole of the latter being so arranged that both plants can be working at the same time, or each plant separately, as required. Each of the drawing-stages has a staircase from the ground level, and the charging-stage can either be reached from the drawing-stage or from outside the house. By means of a spiral staircase, there is easy access to all parts of the machinery. Compared with hand stoking, the adoption of these inclined retorts will no doubt result in considerable advantage to Leeds. Mr. Townsley believes that the wages paid to the stokers at Leeds are among the highest in England; and therefore savings effected by the inclined system and stoking machinery would be greater than in many other towns. In this new inclined retort-house (which has only been in use about a month) the cost of carbonizing works out to 1s. 6d. per ton, including chargers, drawers, firemen, coke slakers, and engine men. Under the old system of hand stoking, the cost was 3s. 3d. per ton; so that a saving of 1s. 9d. is shown. From this have to be deducted interest and depreciation, which will probably be covered by 3d. per ton. At any rate, there is a saving of nearly 50 per cent.

Improvements at the New Wortley Works.

The New Wortley Works, which occupy about 11¼ acres of land, have also, under the present administration, undergone a complete overhauling, and have been brought nearer an up-to-date condition than they have been in for some years. To a large extent, hand stoking has been superseded by machinery. In the summer of 1896, the Council authorized for No. 3 house, which contains 420 retorts, an installation of West's compressed-air stoking machinery, and also sanctioned the laying down of Arrol-Foulis hydraulic stoking machinery in No. 4 house, which contains 486 retorts. The West machinery cost £5692, and the Arrol-Foulis £4950; making a total of £10,642. In addition to this, there has, of course, been necessary expenditure in altering the retort-houses, and in erecting new boiler and engine houses. There are two charging and two drawing-machines on West's system, which charge and draw 210 through retorts four times every 24 hours; and the pressure of air to work them is 60 lbs. to the square inch. The Arrol-Foulis installation consists of four charging and four drawing machines; and they deal with 243 through retorts four times in 24 hours. The air-compressor and the pumping-engine for operating the machinery are situated in a building quite apart from the retort-houses. The hydraulic power is supplied by a pair of high-pressure pumping-engines, driving four single-acting plunger-pumps, 3 inches diameter, with 18-inch stroke, connected to an accumulator, having a ram of 11 inches diameter by 6-feet stroke, weighted to give a pressure of 400 lbs. per square inch. There was, at first, a great deal of wear and tear on the wire ropes of the Arrol-Foulis machines; but, since they have been replaced by chains, the wear and tear has been reduced to a remarkable extent. However, both systems have answered admirably, although the two houses in which the machinery is situated are not exactly what can be called ideal ones for the purpose. They were built many years ago, before machinery of the kind adopted was even thought of. Neither of the houses has a stage-floor; so that all the coke has to be removed from the ground level by barrows. The future, however, may see a system of conveyors in use. But even under present conditions, Mr. Townsley's experience is that, after allowing for interest and depreciation, the machinery effects a clear saving of 9d. per ton of coal carbonized. Out of a total output of 17½ million cubic feet of gas per day, about 8¾ millions are now produced by machine stoking. Other improvements at these works in recent years include the construction of a new set of six purifiers and condensers; while at the present time a coal-store, 300 feet long and 70 feet wide, is being built. A tender has also been accepted for the erection of a new station meter, with a capacity of 100,000 cubic feet per hour. The maximum daily make of gas at New Wortley is about 7½ millions.

The York Street Works.

The changes at the above works during the past six years have only been of a moderate character. They comprise the erection of an exhauster-house to hold two sets of exhausters, each capable of passing 100,000 cubic feet per hour; and the extension of the purifying plant. A coal-store, with a capacity of 7000 tons, has also been built. At the present time, the works are closed for the purpose of adding to the purifying plant and fitting in two new steam-boilers.

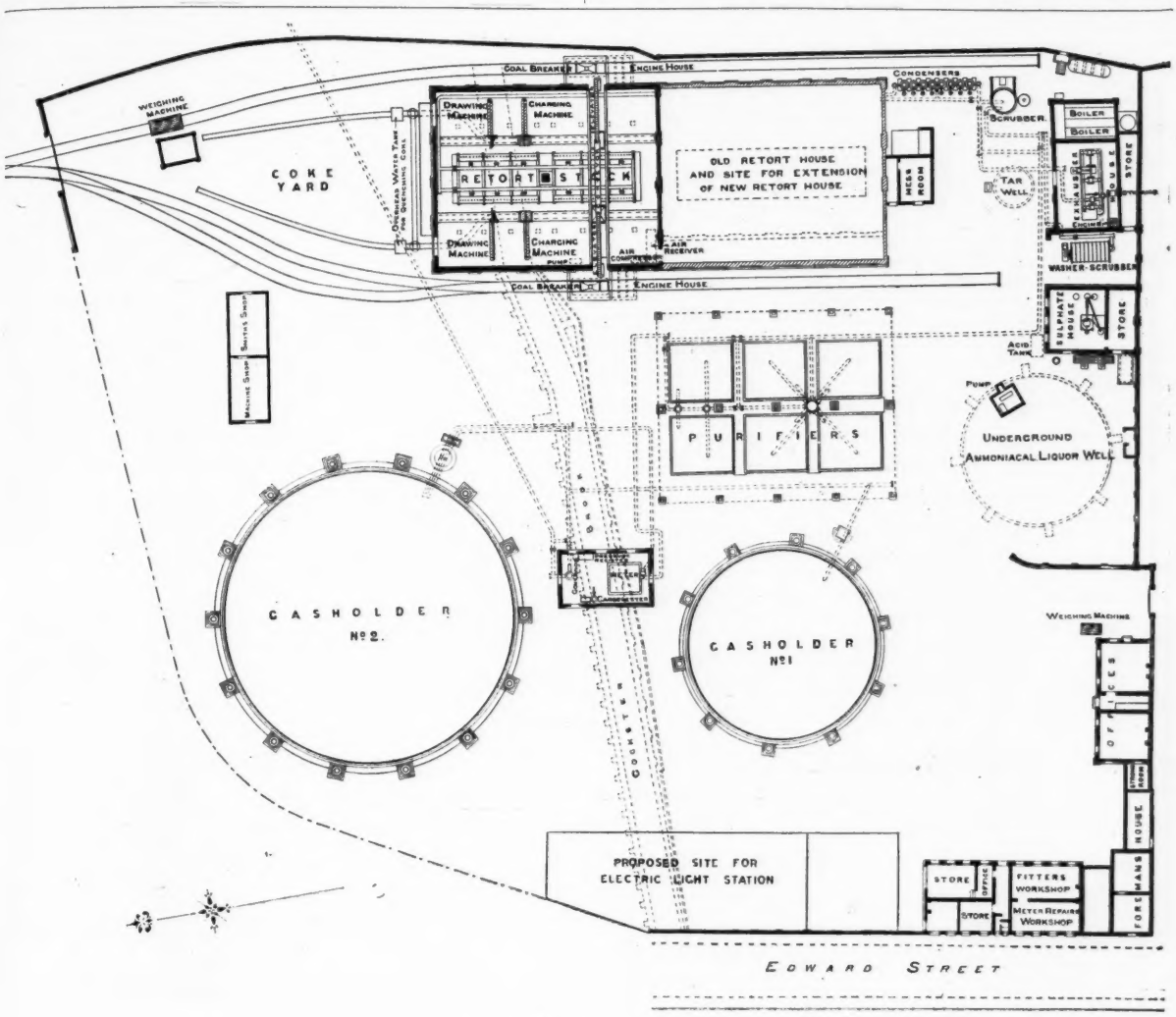
Inspection of the Extensions by the City Council.

With the view of giving the members of the Council a clearer conception of the extent of the improvement which has been achieved at the works than any amount of oral or written description would convey, Mr. Lowden and the Gas Committee invited them to visit the two principal works on Monday of last week. At the time of assembly at the Town Hall, rain was falling heavily; but, notwithstanding, the opportunity of inspecting the plant for which they have voted so much money was not allowed to slip by many of the councillors. The visitors were accompanied by the several gentlemen whose names are mentioned at the beginning of the above article, and who busied themselves in explaining and giving information on all points and objects of interest. It is nearly seven years since the Council paid an official visit to the works; and since then, as already indicated, the stations have undergone quite a transformation. By a happy thought, Mr. Townsley had arranged for the inspection to commence at the New Wortley Works, where the councillors were first shown the men laboriously engaged in charging retorts by means of shovels. Then they were taken into the houses in which the West and Arrol-Foulis charging and drawing machines were being operated; and the contrast between the old and new systems must have commended the latter to even the most obstinate opponent of the progressive policy of the present Committee. Other parts of the works were also inspected, after which the councillors were conveyed to the Meadow Lane station, at which they were to see some of the latest developments in gas manufacturing processes. By the wish of Mr. Lowden, they were first shown what has been done in the reorganization of the workshops connected with the department. The Committee have had these, the stove show-rooms, and the meter-testing work brought under one roof. The workshops are spacious, and have been brought to a high state of efficiency; but from their crowded state, owing to the large amount of work which the Committee find it profitable to undertake themselves, it looks as though further accommodation will soon have to be provided. The repair of meters bulks largely in the work carried on; and it is proposed to shortly equip the shops with machinery for stamping out meter cases, which operation is now performed by hand. From here the councillors were conducted to what was the principal feature of the visit—that was, the inspection and formal opening by the Lord Mayor of the new inclined retort-house already described. On reaching the charging-stage, Mr. Lowden, in inviting his Lordship to declare the house open, showed the necessity for this increase in the productive strength of the works by stating that in foggy weather the consumption of gas had risen to as much as 17 million cubic feet in one day; while the works had only been capable of manufacturing 14½ millions, and the storage accommodation was only equal to 15 millions. Before addressing the company, the Lord Mayor demonstrated the simplicity of the inclined system by depositing a charge of 7 cwt. of coal in one of the retorts. In declaring the building open, he referred to the inclined system as a triumph of mechanical principles over brute force. He was only sorry that it was left to a Frenchman to discover such a simple way of making gas; but he could not help thinking that this was not the ultimate triumph of the art of gas making. He believed that eventually some means of continuous stoking would be discovered, which would do away with the necessity of opening retorts, and so prevent the waste of heat occasioned thereby. The little ceremony ended, the party descended to the lower stages of the house to witness the discharging of a few of the retorts. By an unfortunate, and at the time inexplicable, circumstance, three of the retorts did not eject their contents so freely as on former occasions;* but others illustrated what could be done by swiftly discharging themselves. The sluggish retorts were a disappointment; but the Committee's faith in the success of the system is shown by the fact that, later in the day, the Chairman invited the members of the Council to pay surprise visits to witness the operation of charging and discharging under ordinary conditions. Leaving the building, the company paid a hasty visit to the nearly completed purifier-house and other parts of the works, all of which showed that the extensions and renewals have been carefully planned and supervised. To celebrate the opening of the new retort-house, the Council were subsequently entertained at luncheon at the Town Hall. The repast over, the Lord Mayor, in a pithy speech, proposed the toast of "The Chairman and Members of the Gas Committee;" and it was responded to by Mr. Lowden. He mentioned the interesting fact that, at the time the Council purchased the works, in 1870, the capital cost per ton of coal was £7 16s. 8d.; while at the present time, in spite of the large outlay on new plant, it is only £4 16s. 3d. Referring to the staff, he spoke of the full confidence which the Committee have in Mr. Townsley, and also of the ability of the Station Managers. Several of the figures given in the foregoing article were quoted by him to show the improvement in results that has ensued from the work of the Committee; but still, added Mr. Lowden, much remains to be done. The current year's working has commenced well. In addition to the substantial increases in the consumption of gas already alluded to, the Committee have, by a stroke of good fortune, secured contracts for the supply of 336,000 tons of coal at the same prices as ruled last year, while many other companies and corporations have had to pay advances of from 3d. to 1s. per ton. On this, as on many other points, the Committee are to be congratulated.

* An explanation as to the cause of the trouble has since been received. It appears that the coal which was being used at the time of the visit had been kept in waggons standing in the siding over Sunday, and so was exposed to the heavy rain which fell that day. In addition there is no doubt that the space between the waggons and the top of the breaker pit admitted so much rain, that the elevator boot and breaker pit contained a large quantity of water, which would be lifted by the elevator like a bucket pump, and conducted into the overhead storage-tank. This is confirmed by the fact that some of the workmen saw water run down the charging-shoots into the refractory retorts. Nothing but trouble could be expected with retorts charged with coal and water.

NEW GAS-PRODUCING PLANT AT LONGTON.

The old order of things has given place to the new at the Longton Corporation Gas-Works since Mr. W. S. M'Gregor entered upon the management. As is well known by readers in the Potteries district, and perhaps farther afield, the purchase of the undertaking was a costly transaction for the Corporation; and no doubt they were loth for some time to expend more money than was absolutely necessary in maintaining the works. However that may be, soon after his appointment Mr. M'Gregor exercised his persuasive powers, and convinced the Gas Committee that, for the well-being of the undertaking, money must be spent on a new retort-house and in other directions. Certainly, so far as the old retort-house is concerned, its decrepit appearance suggests that its days are numbered, and that if there had been much more delay in providing further power of production, Longton might have found itself one day without the first means of obtaining gas. But all this has been changed; and the borough now possesses a manufacturing plant which will do them good service for many years to come. Besides the condition of the works, there was another reason why additional and enlarged plant was required. Mr. M'Gregor, with the support of his Committee, has taken active steps to increase the consumption of gas, and with admirable success. It is about two-and-a-half years since he took over the management; and in the two preceding years, the consumption stood at 101 million cubic feet. His first year of office saw a jump to 116½ millions; this was succeeded in the next twelve months by a rise to 125 millions, or about 15 per cent. increase; and if the coming season is a good one from the gas supplier's point of view, the consumption will, in all probability, reach, and perhaps pass, 135 millions. Fortunately, the storage accommodation is good —900,000 cubic feet, or equal to 1¼ days' maximum demand— as, had it been otherwise, we are afraid that Mr. M'Gregor would on some days have found himself stranded. How has the increased consumption been obtained? Partly by the reduction of the price of gas by 2d., and largely by persistent efforts to develop the cooking-stove and prepayment meter branches of the business. Mr. M'Gregor lets out cooking-stoves at a penny



GROUND PLAN OF THE LONGTON CORPORATION GAS-WORKS.

a week. "A penny a week for a cooker" sounds well; and it has had the desired effect. It has secured many new users of such stoves; and the return to the department has been a profitable one. A good feature of slot meters is the tendency of the revenue per meter to increase; and it is found at Longton that from meters which at first yielded (say) £1 1s. per annum, in many cases about £1 10s. is now collected.

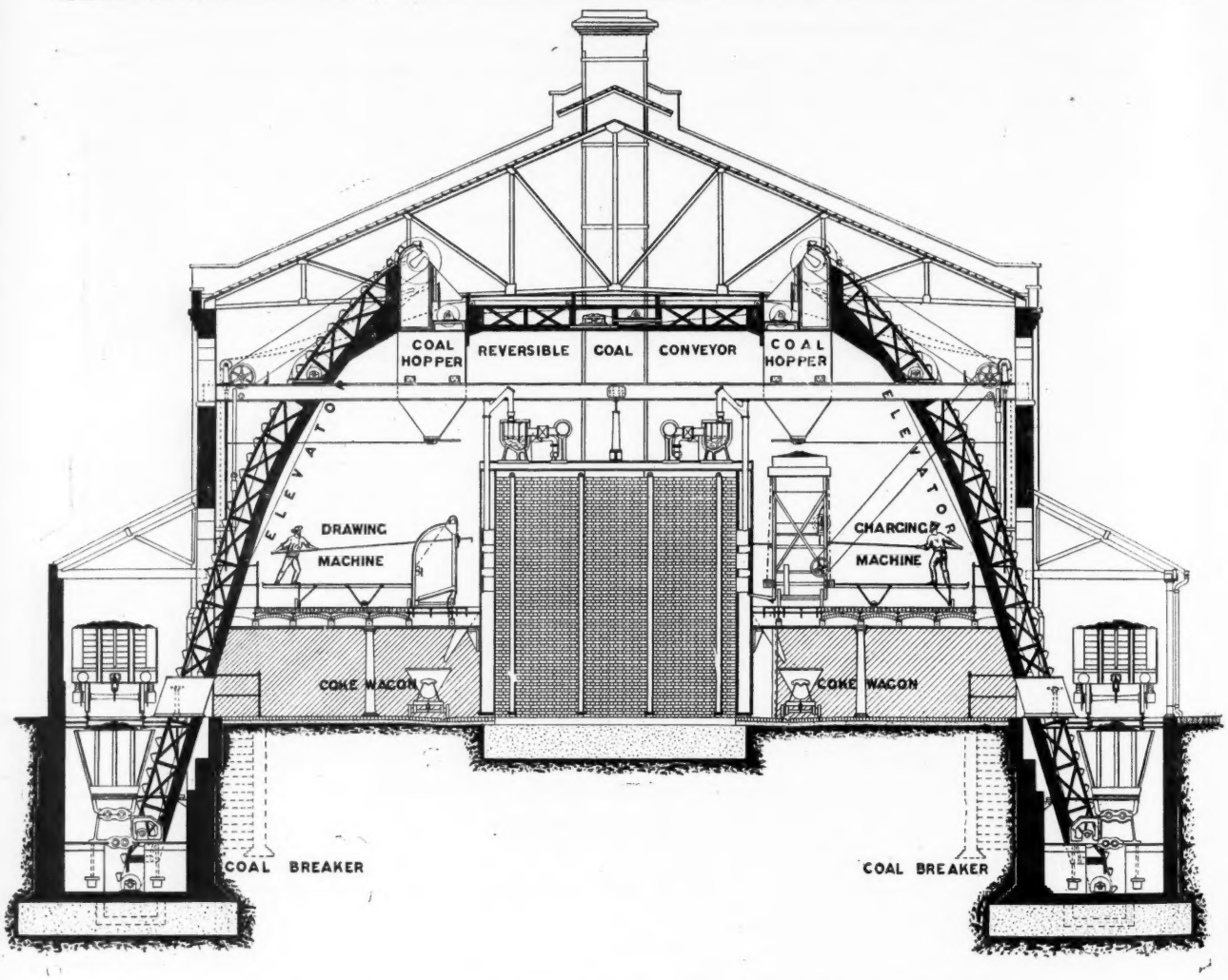
Having shown the necessity which existed for extensions and renewals at the works, we will now describe them; complimenting first the Engineer and the Contractors on the creditable and solid appearance of the whole of the new buildings and apparatus. We give a plan of the works, which shows the lay of the plant; and also [next page] a cross section of the retort-house, both of which may be useful to managers of works of similar size. As will be seen, the house is constructed and equipped on modern and approved lines. It is a plain and substantial building, measuring 90 ft. 6 in. long by 70 ft. wide between the walls, and 35 ft. 6 in. from the ground-level to the shoes of the roof principals. It is constructed with a stage-floor; the basement being on the level with the coke-yard. The roof principals are of steel; and efficient ventilation is provided for by a louvre extending the whole length of the house, and suitable openings in the sides. The retort-stack is 21 feet through above the stage-floor, and contains six beds of nine retorts of 22 in. by 16 in. ∩ section; making a total of 108 mouthpieces. The retorts are heated on Winstanley's regenerator system; each through bed having one producer.

Space was not available on either side of the retort-house for coal-stores. But on each side there is a railway siding; and the coal is unloaded from the railway waggons direct to the coal-hoppers fixed above coal-breakers in connection with the West charging and drawing machinery with which the house is fitted. From the coal-breakers the coal is raised by elevators to overhead coal-hoppers, for supplying the charging-machines. A coal-conveyor is fixed between the heads of the elevators; the gearing being so arranged that the direction of the conveyor can be reversed, and coal conveyed from either elevator to the other side of the house should it be necessary to obtain the supply of coal from one railway siding only. The driving-engines for the coal machinery are of substantial construction,

and are situated in houses, the walls of which are built of white-faced glazed bricks, which give them a clean and light appearance. The charging and drawing machines, which are of the well-known manual type, travel along rails laid in front of the retort-bench; and the coke from the retorts is directed by shoots to coke-waggons below the stage-floor, which waggons run on rails provided with points and turntables to the coke-yard. West's Gas Improvement Company were the contractors for the roof of the house, the coal breakers and elevators, and the stoking machinery; Winstanley's Speciality Company for the retort-settings and stage-floor; and Messrs. Tompkinson and Bettelley for the building.

Regarding the other parts of the improvement scheme, the exhauster plant has been completely remodelled—a new Waller engine and exhauster of 50,000 cubic feet per hour capacity having been fixed, and the two existing exhausters coupled to one engine. A Holmes rotary washer-scrubber, driven by a horizontal steam-engine, has been erected, and is capable of dealing with a million cubic feet of gas per twenty-four hours. A new station-meter house has been built, and contains a station meter, by Messrs. Thomas Glover and Co., of a capacity of 50,000 cubic feet per hour, and a Maxim carburettor, capable of enriching 80,000 cubic feet of gas per day. The gas as made is of rather more than 15-candle power; and it is enriched up to 16 candles, although the Act only requires 14-candle gas to be supplied. The house also contains a Braddock station governor, Sugg pressure-registers, and other appliances. The gas-mains on the works have been re-arranged; and a new main leads to the Town Hall, where a trunk main is connected to supply Dresden and district. Workshops, containing fitters' shop, lamp, meter, and stove repairing shops and stores, also form important items in the extensions. The approximate cost of the reconstruction scheme has been £15,000.

An interesting feature of the works is a small electric lighting plant which has been put down, on the instruction of the Gas Committee, with a view to safety in the event of a mishap on the works at night time. The engine and dynamo only occupy a small corner of the exhauster-house; and the lamps are disposed over the works as follows: 24 in purifying-house, 2 in meter-house, 2 in engine-room, and 16 in offices and elsewhere.



Section of Retort-House and Railway Sidings at the Longton Corporation Gas-Works.

There was a formal inauguration of the new works on Thursday last by Alderman J. L. Johnson, the Chairman of the Gas Committee. The Mayor (Alderman J. Edwards, J.P.), the members of the Council, the borough officials, and a number of neighbouring gas engineers, accepted the invitation to be present; and altogether they were a numerous company. An inspection of the works was made; and many were the expressions of congratulation on the changed condition of the place. In the evening a dinner was given in the Town Hall to celebrate the event; the hosts being Alderman Johnson and Mr. John West, of West's Gas Improvement Company. Many toasts suitable to the occasion were honoured—the speeches all showing that the councillors have the fullest confidence in their Gas Engineer; that they are satisfied with the way the contracts have been carried out; and that they are in accord in believing that the large expenditure they have made will prove remunerative. There were one or two points in Mr. West's response to the toast of "The Contractors" which should be recorded. Speaking of the use of regenerative furnaces, he said that he remembered Mr. George E. Stevenson, now the Gas Engineer at Manchester, having some correspondence with him on the subject 25 years ago, when he (Mr. West) was at Maidstone. It was 23 years since he (the speaker) obtained plans for these furnaces from abroad; and he believed he was the first man in England to put some up. But afterwards there was a little discussion as to whether he or Mr. George Livesey was the first. He only mentioned this to show how long it took for an advantageous improvement of this kind to get a good hold. He proceeded to call attention to the large waste of fuel and irregular heating that resulted in potteries through direct firing, and said it seemed to him that regeneration and gaseous firing should be universally adopted at such works. He was connected with works in Derbyshire where they worked up silica and china clays. There he had been making a large experiment on gaseous firing at a cost of between £5000 and £6000; and he had been successful—in fact, he had succeeded in doing for 4s. that which formerly cost £1. In his opinion, there was something to be done in connection with the application to pottery work of the principles embodied in the regenerative furnaces of gas-retort settings. There were other toasts, but space will not permit of fuller notice.

THE CHEMICAL COMPOSITION AND TECHNICAL ANALYSIS OF WATER GAS.

By EDWARD H. EARNSHAW,

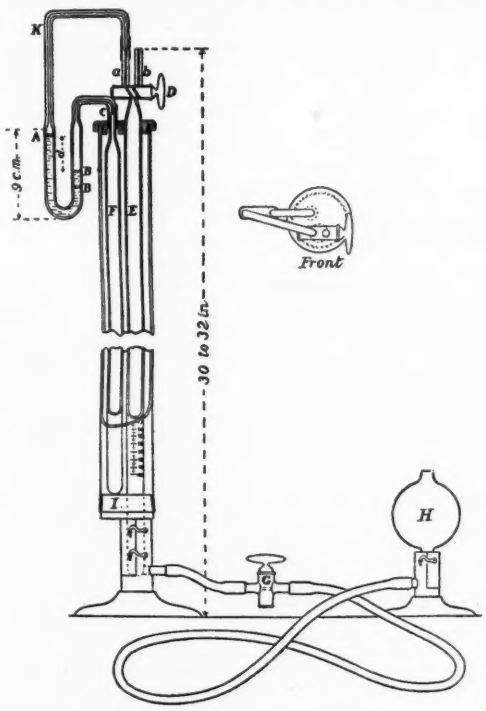
Chemist to the United Gas Improvement Company of Philadelphia (U.S.A.).

[From the "Journal of the Franklin Institute," October, 1898.]

SUPPLEMENTARY NOTE.*

The satisfactory performance of a gas analysis depends in great measure on the accurate measurement of the various gas volumes—a result difficult to attain in the more usual forms of apparatus. A most satisfactory instrument is found, however, in the burette with correction for temperature and pressure described on p. 28 of Hempel's "Gas Analysis." In this apparatus, the gas volume is not measured at atmospheric pressure, but by means of a manometer it is brought to the pressure of a constant volume of air enclosed in a Pettersson correction-tube. The enclosed volume of air is always at the same temperature as the gas volume, since the burette and the correction-tube both stand in the same wide tube filled with water.

Experience has shown the advisability of departing in the following particulars from the method of operation described by Hempel: A mark is placed on the manometer at A, and another mark is placed on the other limb of the manometer at B, about an inch above the bottom. The mark at A should be located so that the size of the space from A, to include the stopcock D, shall be exactly 1 cubic centimetre. This may be readily done thus: Withdraw the manometer-tube from the connection at C; then, by raising the level bulb H, fill the measuring-tube and



manometer completely full of water. Now draw some air into the burette, and note the volume of atmospheric pressure, after allowing sufficient time for the water to run down. Then turn the stopcock D so that the burette communicates with the manometer, and, by raising the level bulb, pass a little air over into the manometer, and at the same time force a little of the water out of the open end of the tube at C. By a slight manipulation, the volume of the air in the burette may thus be diminished by exactly 1 cubic centimetre, while at the same time the liquid in the manometer stands at the same height in both sides.

In the ordinary use of the burette, it is very inconvenient to measure the gas volume with the liquid in the manometer at the same level in both sides, because there is great liability that some of the water will be accidentally forced over into the correction-tube F, and also because a free space is needed to enable the water in the manometer to be moved up and down, and thus clear the correction-tube of the annoying drops of water which persistently remain in it. It is therefore better to make the measurement as follows: Draw the water in the manometer over into the burette until the liquid in one side stands exactly at the mark B, and the other side is completely filled to the stopcock D. When the gas volume in the burette is to be measured, turn the stopcock so that the burette communicates with the manometer, and, by raising or lowering the level bulb H, bring the water in one side of the manometer exactly to the mark A. The liquid in the other side of the manometer will then stand at B^1. Close the stopcock G, and note the size of the gas volume, which will be the reading of the scale *plus* 1 cubic centimetre. By this method the pressure in the burette, instead of being equal to the pressure in the correction-tube, will differ from it by a constant amount equal to the difference *d* between the levels of the liquid in the two arms of the manometer.

It will usually happen, in drawing the gas in the manometer back into the burette, that the liquid in the manometer will be drawn slightly below the mark B. This is of no consequence, as, when the gas has been passed from the burette to the absorption pipette, the stopcock D may be turned, and a little water passed from the burette into the manometer. By this method of operation it is assured that the measurements of the gas during an analysis will be made under absolutely uniform conditions.

Before beginning an analysis, it is advisable to bring the water in the manometer to the mark A, close the stopcock D, and draw the manometer-tube out of the connection at C. This will establish atmospheric pressure in the burette and correction-tube.

Some points in the construction of the burette are worthy of note. The measuring-tube E should have an internal diameter of about 15 millimetres; the instrument will then have a total height of 30 to 32 inches. The correction-tube may be about the same size, or slightly smaller, and must be just long enough to rest on the rubber stopper I, at the bottom, and project about half an inch above the wooden cap J. This cap serves to hold the tubes in their proper position in the water-jacket, and also prevents the manometer from sagging down. The water-jacket tube must be cut of such length that the rubber stopper rests firmly on the burette base, while the top of the tube ends about 1 inch below the stopcock D. In the large diagram, the correction-tube and burette are, for the sake of convenience, shown side by side. As a matter of fact, they are arranged as shown in the small one. The holes are carefully bored in the wooden cap and rubber stopper so as to bring the measuring-tube parallel to, and near, the front of the water-jacket. The correction-tube is placed behind, and to one side of, the measuring-tube, and the connecting-tube to the manometer is bent at an angle, as shown. The U-shaped part of the manometer is about 9 centimetres long and 8 millimetres internal diameter. The connecting-tube K is 6 millimetres outside diameter and 2 millimetres bore. The capillary tubes *a* and *b* are 1½ inches long and 1 millimetre bore.

The stopcock G should be large; and it will be found necessary to secure it in a small wooden block fastened to the table in a convenient position. The iron foot of the burette should also be screwed to the table, as the apparatus is quite top heavy. It is convenient to use two burettes for the analysis. One is graduated from the stopcock D to 100 cubic centimetres in tenths of a cubic centimetre, and is used for the direct absorptions; the other is graduated from 60 cubic centimetres to 100 cubic centimetres in twentieths—the upper part of the measuring-tube being enlarged into a cylindrical bulb and not graduated. This latter is used exclusively for the explosions and combustions, where great accuracy is essential.

* Mr. Earnshaw's original article was recently given in the "JOURNAL" (see *ante*, p. 694; also p. 869).

The Secretaryship of the Sheppy Gas Company.—The final selection from the 86 applicants for this appointment was made by the Directors of the Company last Wednesday; and Mr. H. Barber, of the Portsea Island Gas Company, was unanimously chosen. He will commence his official duties on the 1st of January next, on the retirement of Mr. Marks, who has been invited to fill a vacant seat on the Board when he relinquishes his present position, which, it may be remembered, he has occupied for 36 years.

Church Music by Mr. W. Gadd.—Those of our readers who, like the late Mr. Frank Mead, of Sutton, and others, combine musical with engineering ability, and spend some of their spare time before an organ keyboard, may be interested to learn that Mr. W. Gadd, of Manchester, has lately published, through the agency of Mr. E. Donajowski, of Castle Street, W., settings of portions of the morning and evening services of the Church; the parts selected being the *Te Deum Laudamus*, the *Jubilate Deo*, and the *Nunc Dimittis*. They are all in the key of D; and though there are occasional departures into other keys more or less closely related, the parts run smoothly; while the organ accompaniment is their compression into short score, and not an elaborate production introduced apparently with the view of marring the effect of the vocal harmonies, and nullifying the efforts of the singers to give expression to them. Criticism of Mr. Gadd's work as a composer would be out of place here. Suffice it to say that his settings come well within the capacities of ordinary choirs, and they will take their proper rank among the many beautiful compositions of this class with which Church music has of late years been enriched. We notice that the words of the *Te Deum* differ in a few places from the English text to which Churchmen are accustomed; but this does not, of course, detract at all from the value of the piece as a musical composition.

REGISTER OF PATENTS.

Generating Gas for Motive Power, Illuminating and Heating Purposes, &c.—Scott, F. S. D., of Clements Lane, E.C., and Hawkins, T., of East Ham, E. No. 21,833; Sept. 23, 1897.

The gas produced in accordance with this invention, when mixed with atmospheric air, possesses a very high explosive force, and may be used for driving ordinary gas-engines.

The patentees employ a vessel of copper or some material capable of resisting the action of the chemicals used. The vessel is divided by a horizontal plate into two chambers—the lower one in which the gas is generated, and the upper one to hold the solution employed as it becomes exhausted of its chemical action in producing the gas in the lower chamber. There are preferably three reservoirs connected with the vessel. The first contains about 12 gallons of water; glycerine, 4 ounces; and potash, 2 ounces, or suitable proportions thereof. In the second is sulphuric acid, about 40 lbs.; and bichromate of potassium, 2 ounces. The third contains benzolene or ·680 petroleum spirits. Pipes lead from these reservoirs to drip-chambers, where the amount of chemical solution and also spirit can be regulated. With these drip-chambers is connected a pipe, which is carried through the upper chamber of the vessel into the lower one, and so arranged that the chemical solution is ejected in the form of spray on to the metal used in the production of the gas. This metal is supported on a grid or perforated plate. It consists of iron borings, or shavings, or turnings; zinc may also be used. The effect of the contact of the solution upon the metal is that chemical action is immediately set up, and gas is evolved, which, after passing through a condensing chamber, is taken off through pipes and used for the desired purpose.

Gas Washer and Scrubber.—Kirkham, Hulett, and Chandler, Limited, and Hersey, S., of Palace Chambers, Westminster. No. 25,019; Oct. 28, 1897.

The patentees remark that in washer-scrubbers as hitherto constructed, it has been found that, as the extraction of the ammonia from the gas takes place, the temperature of the gas increases as it passes from bay to bay up to about the middle of the machine; and as a result the extraction of the final trace of ammonia becomes more difficult, and renders necessary a larger number of bays than would be required if the temperature of the gas were kept lower. To obviate this objection, and also to diminish or prevent the deposit of naphthalene from the gas at the outlet end of the apparatus, the patentees propose to employ apparatus of the ordinary construction; but they so arrange one or more of the bays that the washing liquor is bye-passed, and the bays are provided with a number of tubes through which the water for washing the gas is passed before entering the inlet to the apparatus.

Fig. 1 is a sectional side elevation of a washer-scrubber having the present improvements applied to it; and fig. 2 is an end view showing the interior of one of the gas cooling or condensing chambers.

A are the bays containing the rotary scrubbing surfaces in the usual manner; and B is a bay wherein the rotary scrubbing surfaces are dispensed with and around which the liquor passing from one washing bay to another flows through a bye-pass pipe C. The chamber B (which is practically dry) contains a series of transverse tubes D, communicating at the ends with boxes E, divided by partitions in such a manner that the water which ultimately reaches the washing bays enters the tubes D through the pipe G, and flows along them in the direction of the arrows. The water, as it leaves the uppermost tube, travels through the pipe H to the last of the series of bays, through which the gas passes as it leaves the apparatus.

The condensing bay B communicates with the washing bays through the pipes or channels I, which are so arranged that the gas which enters at the lower end of the condensing bay escapes at the upper end.

The gas, after having passed through one or more of the washing bays, enters the condensing bay B, where, owing to its contact with the tubes D, which are kept cool by the water flowing through them, its temperature is considerably reduced, and the extraction of the final traces of ammonia by further washing is facilitated. The cooled gas escaping from the top of the condensing bay again passes through one or more of the washing bays. The water which travels along the tubes D is obviously more or less heated; and this heated water flows into the bay in which the last washing of the gas takes place before it leaves the apparatus. Owing to the contact of the gas with this partially heated water, instead of with cooled water as hitherto, the deposit of naphthalene is said to be diminished or entirely prevented.

Fig. 1.

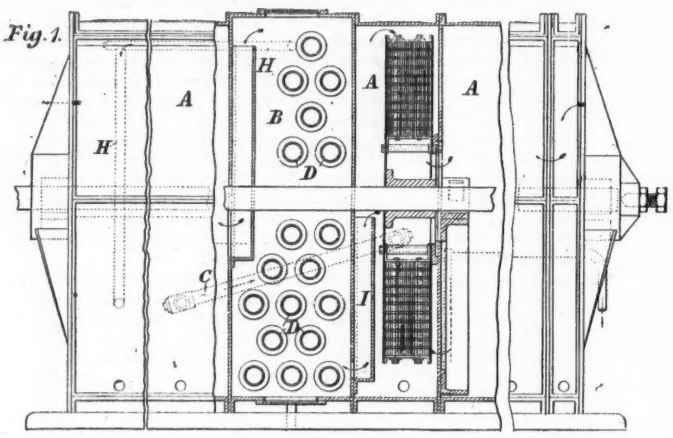
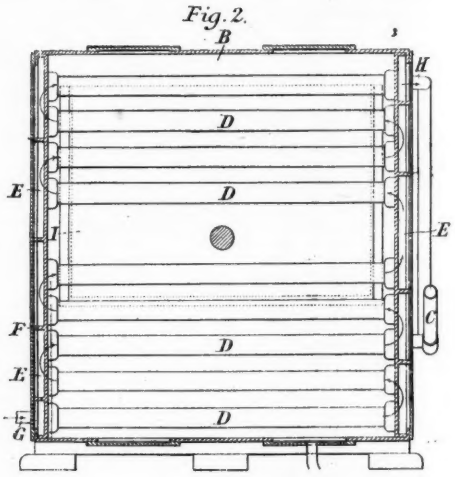


Fig. 2.



Incandescent Gas-Mantles.—Martini, A., of Berlin. No. 26,202; Nov. 10, 1897.

The claims for this invention include: (1) The production and use of incandescent mantles containing compounds of potassium, sodium, lithium, rubidium, caesium, or tin, or of any number of such compounds, in combination with one or more of the rare earths, or with platinum and uranium. (2) A process for the production of incandescent mantles by second impregnation. (3) The production and use of incandescent mantles according to Chardonnet's method, in which an acid basic or neutral compounds of potassium, sodium, lithium, rubidium, caesium, or tin, or any combination thereof, are employed by association with a binding agent—such as a solution of collodion—in addition to the rare earths. (4) The production and use of an incandescent mantle impregnated in a solution of thorium nitrate in a quantity less than 97½ per cent., and small quantities of any of the rare earths in combination with any one or more of compounds of potassium, sodium, lithium, rubidium, caesium, and tin.

In carrying the process into effect, according to one modification, 97½ parts of thorium nitrate are dissolved with 2½ parts of potassium nitrate. With this solution the fabric which is to be impregnated is saturated; then dried, incinerated, and shaped in the fire. The incandescent material, which is very hard, is then dipped quickly into a solution of cerium nitrate, and can be used after being dried. Instead of an aqueous solution, it is preferable to employ a solution of caoutchouc, gutta-percha, and wax. The caoutchouc (as also the gutta-percha) are easily soluble in chloroform, ether, and benzol; but the solvents may be varied according to the origin of the substances to be dissolved. Gutta-percha rarely occurs in commerce in a utilizable form, says the patentee; so that it must be first dissolved in turpentine oil, precipitated with alcohol, and again dissolved in chloroform. A great quantity of caoutchouc contracts the incandescent material, and makes it temporarily harder; while wax and gutta-percha have a favourable effect upon its suppleness. Into the solution so formed, a percentage of cerium nitrate is added; the cerium nitrate being first mixed with alcohol. If the mantle be dipped into a solution of this kind, the cerium nitrate will become deposited on the surface of the threads of the mantle fabric, and the volatile substances will rapidly evaporate. Mantles of this kind on being dried are ready for use.

Other mixtures may be employed for the skeleton of the fabric of the mantle—for example, 10 parts of tin chlorate, 87½ parts of thorium nitrate, with 2½ parts of potassium nitrate; while the second impregnation with cerium can be wholly or partly replaced by other rare earths, or uranium and platinum. In this connection, it may be stated that the patentee has found that "the simultaneous use of cerium and didymium in the process produces a beneficial effect, contrary to the general view."

Prepayment Gas-Meters.—Anderson, J., of Edinburgh. No. 26,370; Nov. 12, 1897.

This invention relates to coin-freed or prepayment gas-meters, constructed on the same lines as that described last week, p. 870.

According to these improvements, a spur-pinion is mounted on a spindle connected to the coin-turning barrel, and gears into a spur-wheel on a boss or sleeve mounted loose on a parallel spindle. A bevel-wheel is also mounted on this sleeve; and a bevel-wheel is mounted on a radial stud or spindle connected to, and projecting out at right angles from, the aforesaid spindle. It gears into the wheel and also into another bevel-wheel (termed a secondary bevel wheel) on a sleeve mounted loose on the same spindle as the first-named bevel wheel.

As the coin-turning barrel rotates after the insertion of each coin, the spur-pinion turns the spur-wheel; and the bevel-wheel on the same sleeve turns the bevel-wheel on the stud at right angles. The parallel spindle is thus correspondingly turned; and a pin on the latter works into a groove or clutch on the spindle of the gas-controlling valve, and lifts and opens the latter to pass gas to the meter. A toothed wheel is mounted on the same boss as the secondary bevel-wheel, and gears into a worm on a spindle connected through wheel gearing to the ordinary mechanism of the meter.

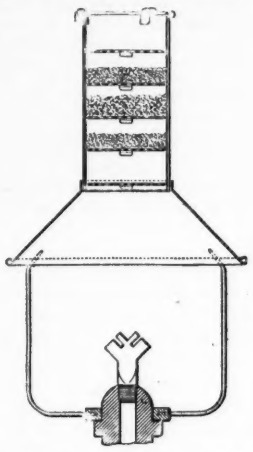
As prepaid gas is being consumed, the worm and worm-wheel are actuated by the ordinary mechanism of the meter; and the secondary

bevel-wheel acts on the wheel at right angles, and turns the spindle in the opposite direction to the first bevel-wheel, and so acts on and closes the valve when all the prepaid gas has been consumed.

A pointer is mounted on the end of the parallel spindle, to indicate the number of prepaid coins for which gas has still to be supplied; and a tilting lever is operated on by a pin on this spindle to obstruct the coin-slit when the maximum number of coins have been inserted.

Purifying the Combustion Products from Acetylene Flames.—Billwiller, J. S., of St. Gall, Switzerland. No. 28,003; Nov. 27, 1897.

In order to remove from the products of combustion of acetylene gas flames, "injurious admixtures, such as, for example, phosphoric acid," the patentee proposes to pass the products through a tubular body (as shown), divided by strainers into several compartments. Some of these compartments are empty, and in them condensation takes place "which is promoted by the fact that the motion of the current of the products of combustion is retarded by having to pass through the strainers, and that the products of combustion are thereby several times divided or more distributed." The injurious admixtures (especially the phosphoric acid)

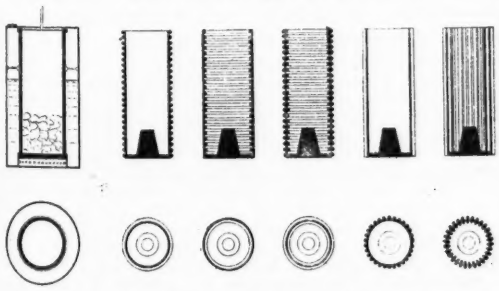


are precipitated after a short time in the form of a "sparkling coating" on the walls of the compartments. The other compartments of the tubular body are filled with an absorbent and refractory material impregnated with a basic liquid and subsequently dried. As an absorbent material, pumice stone, asbestos (in the form of fabrics or not), porous clay, or the like may be employed. As a suitable impregnating fluid for these materials, there is preferably employed a solution of potassium carbonate of 50 per cent. strength.

When the products of combustion pass through the compartments charged as described, the acids mixed with the products are neutralized by the bases. The last strainer of the tubular body consists of a narrow-meshed sieve, which has for its object to keep back any small particles of carbon that may be carried over.

Acetylene Generators.—Billwiller, J., and Rosenthal, K. E., of Berlin. No. 14,050; June 24, 1898.

The characteristic feature of this apparatus for the production of acetylene gas is that the carbide is placed in a closed receptacle, formed of porous material, permeable by water; so that, when the water from without enters the receptacle, a gas-generating action is brought about. But, if the pressure of gas be too strong, the water is forced back through



the porous sides of the receptacle, for the purpose of reducing the subsequent giving off of gas to the smallest possible extent. The receptacle is furnished with hollows, recesses, projections or the like, for the purpose of enlarging its contact surfaces for the carbide as well as for the water, and altering the cross-section as may be desired. The different forms it may take are shown in the engraving in section and plan.

Calcium Carbide Manufacture.—Woods, J. E. T., of Stockwell, S.W., and Byrom, W. A., of Great St. Helens, E.C. No. 14,453; June 30, 1898.

The process described in this invention comprises two stages—the production of the gaseous mixture necessary to make carbide of calcium; and the production of carbide of calcium proper.

In carrying out the first stage of the process, the patentees fill a number of retorts provided with suitable connections, as well as with an inlet and outlet pipe, with hydrated oxide of iron or bog iron ore, and heat to a temperature of about 1000° Fahr. They then cause a current of crude petroleum vapour, produced in a separately heated vessel, to pass through the retorts, whereby the oxide of iron is reduced to spongy iron, while a certain quantity of steam is formed, and some free carbon is deposited. The gas escaping from the outlet-pipe of the last retort (consisting chiefly of acetylene and marsh gas) is conveyed to and stored in a suitable holder. A current of steam being subsequently allowed to pass through the retorts kept at the temperature named, the spongy iron is converted again into iron oxide, and free hydrogen is generated from the decomposition of the steam which takes place and partly combines with the free carbon deposited—forming both acetylene and marsh gas. The gas escaping at the outlet consists now of acetylene, marsh gas, and a large quantity of hydrogen, all of which is conveyed to the holder above mentioned. The gases intermingle in the holder, and constitute the gaseous mixture, the production of which is the first step of the process. The retorts and connections are of the same description as those used for manufacturing illuminating gas, and so need not be described.

To carry out the second part of the process—*i.e.*, the manufacture of carbide of calcium—an apparatus is employed consisting of a conical casing or shell (preferably of steel), provided with two diaphragms or partitions fixed air and gas tight to the inside wall of the shell. The diaphragms form two chambers, the uppermost of which is an air-chamber, while the lower one is a gas-chamber. The chambers are each provided with an inlet fitted with a screw-valve of suitable construction; and the two diaphragms are furnished with a number of tapped perforations, into which are screwed the upper ends of central tubes with other tubes concentric to them. The lower ends of the tubes enter the perforations of a shield secured to the lower end of the shell or casing; the first-named tubes thus communicating with the air-chamber, and the latter with the gas-chamber. Air is forced in by means of a fan or blower, and the inlet is connected to the supply-pipe of the holder containing the gases produced in accordance with the first stage of the process. The crucible or furnace employed is provided with three of the blowpipe burners just described; the nozzles converging towards the centre, where is an opening through which a mixture of fine charcoal and lime is fed. As soon as the blowpipes are set in action, intense heat (reaching a temperature of from, say, 4000° to 5000° Fahr.) is quickly raised; and this converts the mixture in the furnace into carbide of calcium.

Substances for Producing the Automatic Ignition of Gas.—Pierron, L., of Brussels. No. 15,414; July 13, 1898. Date claimed under International Convention, March 9, 1898.

The object of this invention is "the production of compound bodies or substances capable of effecting the automatic ignition of gases by producing a condensation or a combination with the oxygen of the air, resulting in the high increase of temperature; the purpose in view being to produce an igniting body or substance not requiring to be withdrawn from the flame by mechanical means immediately after the ignition has been effected."

The claims advanced by the patentee (after detailing his proposals for forming ignition powders, pastes, &c.) are the following:—

First. Compound bodies for effecting the automatic ignition of gases consisting of one or more known bodies, with a base of platinum or of metals of the same group (an igniting element), capable of causing the gas to so combine with air as to produce ignition and combustion—such as spongy platinum—and a supporting element of substance, such as oxides of silicium, zirconium, titanium, niobium, tungsten, molybdenum, tantalum, vanadium, aluminium, iron, manganese, &c., or other bodies infusible under the conditions of use, non-volatile, unalterable in the presence of air, and incapable of reacting upon each other or upon the igniting element; the bodies or substances being employed in a porous or finely-divided state, either alone or in combination with each other.

Secondly. In a compound body or substance for effecting the automatic ignition of gases, the use as a supporting element (for preventing the igniting element from agglomerating) of oxides of silicium, zirconium, titanium, niobium, tungsten, molybdenum, tantalum, vanadium, aluminium, iron, manganese, &c., separate or mixed, the oxides being obtained in an absolutely pure state either by starting with the natural products, to which the desired shape is given, and subjecting them to the requisite chemical operations, or by precipitation and washing; the pure oxides being in the latter case mixed with an organic component, in order to form a paste which is subsequently moulded, dried, and calcined.

Thirdly. Compound bodies or substances for effecting the automatic ignition of gases, comprising an igniting element formed of one or more known bodies capable of effecting the ignition, and a supporting element fulfilling the conditions stated in the first and second claims in a solid or powdered state, obtained by reduction or calcination of a mixture of the two elements taken in solid or liquid form.

Fourthly. Compound bodies or substances for effecting the automatic ignition of gases after having been subjected to the action of heat, comprising an igniting element formed of one or more known bodies capable of effecting such ignition, and a supporting element fulfilling the conditions stated in the first and second claims in the state of a liquid, a paste, a tissue, or a thread, and obtained by a mixture of the two elements taken in a solid or liquid form.

APPLICATIONS FOR LETTERS PATENT.

21,285.—Justice, P. M., "Lighting and extinguishing street and other lamps." A communication from A. G. Kent-Johnston. Oct. 10.

21,314.—Boult, A. J., "Incandescent mantle supports." A communication from La Société Générale d'Incandescence par le Petrole. Oct. 10.

21,337.—Porter, W. H., "Production of stable catalytic material and catalytic gas-lighting tips or burners and tufts." Oct. 11.

21,441.—Gantke, H., "Improvements in illuminating contrivances." Oct. 12.

21,456.—Smith, F., "Burners for incandescent gas lighting." Oct. 12.

21,462.—Foster, W., "Stoppers used in gas-retorts." Oct. 12.

21,564.—Glaholm, F. J., "Acetylene gas apparatus." Oct. 13.

21,576.—Barltrop, W. P., "Acetylene lamps." Oct. 13.

21,601.—Daubenspeck, G., "Incandescent mantles." Oct. 14.

21,643.—Doman, W., "Generation of acetylene gas." Oct. 14.

21,691.—Praag, D. J. van, and Harker, F. W., "Acetylene generating apparatus." Oct. 14.

21,760.—Micheroux, Count A. D. de, "Apparatus or oven for the production of coke and lighting gas, with recovery of the bye-products." Oct. 15.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Intelligent v. Unskilled Labourers for Working Inclined Retorts.

SIR,—I think the remarks of Mr. Maurice Graham in your issue for Oct. 18 (p. 871), in reference to unskilled labour as applied to charging inclined retorts, ought not to pass unnoticed, for they do not, in my opinion, correctly state the case.

It is true that charging inclined retorts is not what is technically termed "skilled labour," any more than is the charging of horizontal retorts with the shovel, or any other of the operations of gas making; but that it requires no skill to perform this work satisfactorily I cannot admit. As well might it be said that the manipulation of stoking-machines for drawing and charging horizontal retorts is mere labourers' work; yet we pay higher wages to the men who work the machines than to any other men employed in the retort-house. If the object of applying machinery to do the work of the carbonizing department were to get rid of skilled labour, the men would have reason enough for objecting to its adoption. For my part, I regard it in a different light altogether. We do not want men who have learnt a "trade" to do retort-house work, but we do want men of intelligence, who understand, and take an interest in, the use of machinery; and such men we employ in preference to mere labourers.

The use of machinery has undoubtedly raised the standard of the men employed in the retort-house, and, in consequence, we have a better educated and more intelligent class of men than formerly. I am happy to be able to say that on works where stoking machinery has been long in use, most of the men regularly employed know how to work machines if required, and, although they cannot be always engaged on that work, their knowledge makes their services more valuable, and enables them to earn more on the average than they otherwise would.

Wherever inclined retorts are introduced, it will be found an advantage to put men to charge them who have already had some acquaintance with the working of mechanical appliances, and not raw labourers. The possession of a staff of such men forms a valuable reserve upon which to draw for all kinds of operations. Such men are doubtless more keen to get good pay for their work, and more ready to complain of excess of work being put upon them; but, on the other hand, they are more open to reason, and better able to understand their own interests than mere labourers, and they will not so lightly throw up their job, or relinquish the position they occupy.

G. E. STEVENSON.

Manchester, Oct. 19, 1898.

The Swansea Gas Company's Reserve Fund.

SIR,—In your review of "The Gas Acts of 1898" in the "JOURNAL" for the 11th inst., you state, in reference to the Swansea Gas Act: "The capital is consolidated into 5 per cent. stock, increased by £120,000 with the usual borrowing powers . . . . *The reserve fund is not to be increased*, nor borrowed money to be converted into share capital." Allow me to correct the portion of the paragraph italicized, as otherwise it may mislead your readers.

Section 19 of the Act states: "The reserve fund of the Company in respect *of their capital existing at the passing of this Act* (£135,000) shall not be increased by reason of the consolidation of such capital." That is to say, the original capital of £135,000, consisting of shares entitled to 10, 7½, and 7 per cent. dividend, and increased by consolidation to £202,000, shall not be entitled to a reserve fund *on the increased portion of the consolidated capital, £67,000*, which was the amount added to the £135,000 to reduce the various dividends to 5 per cent. on the whole consolidated capital, now amounting to £202,000. The section does not refer to the *new* or *additional* capital of £120,000 authorized to be raised by the Act, which, of course, is entitled to the usual reserve fund. The Company are entitled to a reserve fund on the original capital of £135,000 under the Acts of "1861 and 1888," and also on the additional capital of £120,000, "New Capital, 1898."

THORNTON ANDREWS, Engineer.

Swansea, Oct. 22, 1898.

The Origin of Gas Associations.

SIR,—Since my letter on this subject in the "JOURNAL" for the 27th ult., I have been in correspondence with my genial friend Carlow, of Arbroath, who, as Secretary of the North British Association, has everything at his fingers' ends; and he has furnished me with an excerpt of the minutes of the meeting, as follows:—

[COPY.]

At Cupar-Fife, the Twenty-fourth day of January, Eighteen hundred and sixty-two years. In a Meeting of Gas Managers.

Present: Mr. Lowden, of Leven; Mr. Myers, of Broughty Ferry; Mr. Procter, of Forfar; Mr. Mackenzie, of Cupar. Mr. Lowden was called to the chair.

Some conversation took place upon the subject of forming an Association of Managers of Gas-Works, for the purpose of cultivating friendly intercourse and good feeling amongst its members, and the free interchange of ideas upon all matters connected with the profession.

Each gentleman present having expressed an opinion favourable to the formation of such Association, the present meeting unanimously agree to invite the co-operation of managers in other places, especially those in the counties of Fife, Perth, and Forfar, with the view of carrying the same into effect, and appoint a general meeting to be held in Cupar upon the last Wednesday of July next, at twelve o'clock noon, for that purpose.

Mr. Mackenzie is requested to give intimation of these proceedings to the different parties in the counties above named, and request their attendance on the day named.

Signed in name and by appointment of the Meeting,

J. LOWDEN, Chairman.

[Certified to be a true copy.—Robt. S. Carlow, Secretary, Gas-Works, Arbroath, Oct. 13, 1898.]

From the foregoing, it is clear that my memory has played me false, and the meeting did not fall in "the summer of 1861," but on the eve of Burns's natal day, amid the blasts of January winds. I must suffer a little disillusionment, and yield the palm of pioneers to the men of Waverley, or the country of Sir Walter Scott and the Ettrick Shepherd, and we men of the "Kingdom of Fife" and the "Little Minister's" county be content with a good place as second to the fore.

G. T. MYERS.

Smethwick, Oct. 20, 1898.

The Wolff System of Purifying Acetylene Gas.

SIR,—In the "JOURNAL" for the 4th inst. (p. 744) there is a description of the domestic installations of acetylene plant of the Allgemeine Carbid und Acetylen Gesellschaft, of Berlin; and reference is made to my improved system of purifying, which is employed with all the Company's apparatus. Your description is not quite correct; and therefore I should like to rectify some slight errors in order to prevent misconceptions.

You very correctly state that the ammonia and the greater part of the sulphuretted hydrogen are abstracted by washing with magnesium chloride; but you proceed: "It [the acetylene] is then treated with lead acetate and silver nitrate, which remove the phosphuretted hydrogen and whatever sulphuretted hydrogen remains in the gas." This is incorrect, and is probably due to a wrong interpretation of the German text. The lead acetate and silver nitrate merely serve as re-agents to indicate the presence of the two injurious impurities named—thus showing the efficiency of the purification, and the time for renewing same; but they do not constitute the purifying material itself. It is best and most easily employed with Eckelt's acetylene tester, described on p. 745 in the same number. These substances cannot be used as purifiers—in the first place, because they are far too costly for commercial use; and, secondly, because the silver nitrate combines with acetylene. My method of purifying for phosphuretted hydrogen is to employ hypochlorite of calcium in combination with various other substances; and you have already directed attention to it in connection with an article in the "Chemiker Zeitung."

PAUL WOLFF.

Berlin, Oct. 15, 1898.

[Dr. Wolff's correction is very welcome, as our description of the scheme of purification elaborated, according to our German contemporary, by Professor Pictet and Dr. Wolff, was necessarily defective owing to the incompleteness of the account on which it was based. The scheme appeared to differ essentially from that of Dr. Wolff described in the "Chemiker Zeitung," and in the "JOURNAL" for June 14 (p. 1375). Certainly no mention was made of "hypochlorite of calcium" in the German account of the Pictet-Wolff system; and the use of magnesium chloride does not appear to have been contemplated by Dr. Wolff when he first described his system in the "Chemiker Zeitung." We hope to give shortly a summary of a very comprehensive paper by Dr. Wolff on the "Present Position of Acetylene Lighting," in which incidentally the purification of the gas is fully discussed.—ED. J.G.L.]

A Question as to Extensions of Works.

A correspondent asks if any of our readers connected with gas-works owned by local authorities have been able to extend their works on land not originally scheduled, without obtaining the leave in writing of all "owners, occupiers, and lessees within 300 yards of the site;" and, if so, what was the process adopted.

LEGAL INTELLIGENCE.

Alleged Bribes on Gas Contracts.

At the Halifax County Court, a case recently came before Judge Cadman in which Messrs. Jonas Drake and Son, of Ovenden, sued the Rowley Regis and Blackheath Gas Company to recover the balance of an account for goods supplied. Defendants had deducted a sum of £20, on the ground that it had been offered to their Manager as a bribe for obtaining plaintiffs the contract, and that therefore they were entitled to the money. The total amount of the account was £543. After entering their defence, the defendants withdrew it; and application was made by Mr. Waugh that costs should be allowed the plaintiffs on the higher scale. He said Messrs. Drake had from the first repudiated that they promised any commission; and they were obliged to come into Court to defend their character. It was a case where the defendants ought to compensate them for all the costs they had incurred. Mr. Parker, for the defendants, quoted a case to show that a question affecting the character of an individual could not be regarded as of public interest. Mr. Waugh pointed out that here a class of persons were interested. His Honour said it was a matter of notoriety that the practice of offering bribes obtained very largely, and it was one that was highly immoral. To charge a firm with it was to charge them with a disagreeable thing. The question raised was undoubtedly of importance to a class of persons; and he thought the plaintiffs were entitled to the costs they asked for. Judgment was entered accordingly.

A Rotherham Gas Worker Charged with Intimidation.

At the Rotherham Police Court, last Thursday, Joseph Worrall, a gas worker, was summoned for intimidating a workman named William Yates, with the view of compelling him to cease employment at the Rotherham Gas-Works. The Town Clerk (Mr. H. H. Hickmott) prosecuted. He stated that recently the Corporation had introduced inclined retorts, which had enabled the management to dispense with a certain amount of labour. The man Yates was engaged under the improved arrangements; but the other workmen had declined an offer made to them to work these retorts. On the previous Monday, the defendant, an ex-employee, met Yates in a public-house, threatened him, called him a "blackleg," and wanted to fight. Defendant took hold of the man's collar, and wished him to go on to some vacant land to fight the matter

out. Yates told the defendant that he should not fight, and that if he struck him he would go and report the matter to the Manager (Mr. F. A. Winstanley). He mentioned the matter to his foreman, who at once took further action. The Corporation were determined to protect their workmen, and they had suggested that these proceedings should be brought. The Corporation regarded it as serious that the men who worked for them should be interfered with. The section of the Act of Parliament under which the information was laid provided that the Bench might impose a penalty not exceeding £20, or imprisonment not exceeding three months. He should ask them, if they had the power, whatever decision they might come to with respect to defendant's punishment, to bind him over to keep the peace. He thought such a course would have a beneficial effect in dealing with the dispute at present pending at the gas-works, and in protecting the men in their service. The defendant elected to be tried by jury; and he was accordingly sent or trial at the Sessions.

The Supply of Water at Ventnor.

At the Hampshire Quarter Sessions last week, two days were occupied in hearing an appeal by the Ventnor Gas and Water Company from a decision against them by the Ventnor Urban District Council at the Isle of Wight Petty Sessions on the 20th of August last (*ante*, p. 488), when the Company were fined by the Council for failing to supply sufficient water for public use. Mr. B. Davis and Mr. T. Cooke appeared for the appellants; Mr. H. Ruegg, Q.C., and the Hon. G. Colville represented the respondents. For the latter it was urged that on quite fifty occasions the Council had been unable to get water for flushing purposes; that the Company could have obtained plenty, but that the storage was insufficient to meet the needs of the town—being no greater than it was twenty years ago. The Company had asserted that they would be able to supply any quantity of water that might be required; but there had been great waste from inadequate storage, and in June and July last the supply was short, though up to the end of the latter month there had been no great lack of rain. The Chairman of the Ventnor Urban District Council (Mr. Wetherick) in substantiating the respondents' case, admitted that there had been friction between the Council and the Company; but he denied that the former had any desire to "buy the Company out." For the appellants, it was stated by Mr. Baldwin Latham that their pipes were ample in diameter for the requirements of the town, but that the springs in the Isle of Wight and in Ventnor itself had been reduced by the late drought to one-third of their average capacity, and that they had been falling since March last. Other evidence was given to prove that the deficiency had arisen owing to the misunderstanding between the officials of the Company and of the Council, which resulted in the water not being turned on at the time it was required. The Court took time for deliberation, and ultimately dismissed the appeal with costs.

The Reinstatement of Roads after Pipe Laying.

At the Durham Quarter Sessions last Wednesday, before the Right Hon. J. L. Wharton, M.P. (Chairman), and other Magistrates, an appeal by the Sunderland and South Shields Water Company against the Castle Eden Bench of Magistrates came on for hearing. Mr. J. Strachan, Q.C., and Mr. Simey were for the appellants; and Mr. Glynn for the respondents. Mr. Glynn, in opening the case, stated that the appeal was against a conviction of £5 and costs made upon the Company by the Castle Eden Magistrates, under section 33 of the Water-Works Clauses Act, for neglecting to properly restore 550 yards of highway in the district of the Easington District Council, which had been taken up by the Company in order to put in a 21-inch main. The conviction followed proceedings instituted by the Council, who were responsible under the County Council for the proper maintenance of the road. The work commenced in December last; and before the trench was cut, the road carried a hard crust of macadam, was well shaped, and in excellent condition. The trench dug by the appellants was 5 feet in depth; but instead of reinstating and making good the road, they left it in a very unsatisfactory condition. The material which had been taken out of the trench was simply filled loosely into the hole; the result being that the road had now got into an exceedingly bad and indeed dangerous condition. Witnesses were called who spoke to the good state of the road before, and its bad condition after, the laying of the main. Mr. Strachan's case was simply a denial of these statements. The Company had, he said, a mass of evidence which would go to prove that the road was not as good as the Council asserted before the trench was cut; and, further, they held that the trench had been properly filled, and completed in a workmanlike manner. The work had been carried out by Messrs. Hawksley, whose name and reputation in work of this kind was a guarantee that it was properly executed. Mr. John Sellick, the Clerk of Works to Messrs. Hawksley, stated that the material was put in the trench in 6-inch layers, and rammed with 20-lb. rammers. The macadam was left to the last, and laid on to form the crust. Afterwards the road was well rolled. Mr. Edwards, County Surveyor for the West Riding of Yorkshire, and Mr. Walter Stead, Surveyor to the North Riding of Yorkshire, were called, and declared that the filled-in trench was generally a better piece of metalling than the other portions of the road. The Bench, after hearing other evidence, dismissed the appeal, with costs.

A New Reservoir for Harrogate.—The ceremony of cutting the first sod of a new reservoir to supplement the Harrogate water supply took place yesterday week. The site of the reservoir is at Scargill, where the Corporation—who recently acquired the Water Company's entire undertaking for £206,000—have purchased a gathering-ground of 1100 acres. The reservoir will have a surface area amounting to 32 acres, with a maximum capacity of 220 million gallons. It is anticipated that the work of construction will be completed in about three years; the estimated cost being £100,000. The work is being carried out by the Corporation, under the superintendence of Mr. W. E. Dixon, the Water Engineer. The cutting of the first sod was performed by Alderman C. Fortune, Chairman of the Water Committee; and the event was afterwards celebrated by a luncheon.

MISCELLANEOUS NEWS.

AGITATION AMONG GAS WORKERS.

An Appeal by the Gas Workers' Union—Troubles in the Provinces.

Reports which have lately reached us through the usual channels have furnished very significant signs that there is at present a good deal of agitation among the gas workers in various parts of the country. Complaints have been made of the hardness of the work and the smallness of the pay; and they have been followed up by applications for lightening one and increasing the other. As will be seen by what appears below, trouble has arisen at Rotherham over the inclined retorts; while at Yeadon the men have come out on strike because an increase of wages was refused by the Directors. With regard to the Metropolis, evidences have not been wanting of there being something "in the air." It was reported that application had been made to The Gaslight and Coke Company, by the General Secretary of the Gas Workers' Union (Mr. W. Thorne), for an advance of 1s. a day in the men's wages; and that it had been refused. As a consequence, it was rumoured that the whole of the men belonging to the Union would be ordered out on strike.* All doubts as to the existence of an agitation were removed by the publication of the following circular:—

To the Gas Workers of London.

Fellow-Workers,—In March, 1889, the Gas Workers' and General Labourers' Union was formed for the purpose of reducing the work and hours, and increasing the wages of all sections of men working in the carbonizing departments of the various gas-works. In the same year, it was successful in getting the hours of labour reduced from twelve to eight, with a slight reduction of work, but no extra wages. On the 11th of November, 1889, the Engineers of the London Gas Companies agreed to give double time for Sunday work between the hours of 6 a.m. and 10 p.m. An agreement was also made between the Engineers and the Executive of the Union that no extra work should be done unless they were short of gas, or in case any of the men stopped away from their work, and then only three mouthpieces per man, or nine mouthpieces per gang. But what has happened to the men in the carbonizing department during the past few years? They have had to do more extra work than was agreed to between the Engineers and the Executive. They have to carbonize more coal in consequence of the scoops being made deeper, wider and heavier, and the "nigger driving" that prevailed before the Union started is becoming the practice again. But why? The gas workers themselves, perhaps know best. Let it be known that the men in the carbonizing departments have not had any direct increase of wages for the past 22 years, whilst at the same time the wages of all classes of workmen have been increased at least 25 per cent. Therefore, do you not think it worth while joining hands with the 40,000 of your fellow-workers who are in the Union for the purpose of getting better wages for the hot and laborious work you have to perform? We therefore ask you all—scoop drivers, front men, machine men, firemen, coke-hole men, coal-wheelers, and others, to again show the spirit you did in 1889, with a view of demanding that which you are justly entitled to—namely, higher wages and less work, which all gas companies can well afford to give. The profits of the London Gas Companies amount each year to about 1½ millions sterling. Think what this means, men! Think how much sweat is lost in making this huge profit! We therefore appeal to all London gas workers to at once join the Gas Workers' and General Labourers' Union, and not allow creed or nationality to divide you as it has done in days gone past, so that we may present that solidarity that was shown in 1889, and show to the Directors at least that you are human, and not mere profit-making machines.

The Executive Council,
W. THORNE, General Secretary.

Last Thursday, the stokers employed at the Rotherham Gas-Works invited the ratepayers of the borough to a meeting at St. George's Hall, to hear an explanation of the circumstances in connection with the dispute which has arisen at the works. Mr. J. Carroll presided. The Chairman remarked that, as a ratepayer, he was willing to lend assistance to the gas workers in order that they might ventilate their grievances. Contentions had, in his opinion, existed too long at the works; and it was time they were ended. Mr. Black, one of the workmen, said the first proposal they received from the Manager (Mr. F. A. Winstanley) was 4s. 8d. per day in connection with the new inclined retorts. The men refused this offer, and agreed to meet the Manager. They did so, and he asked them to see the Chairman of the Gas Committee. A deputation of the workmen afterwards waited upon the Chairman, who promised to put the 4s. 8d. on one side, and asked them to work at the new retort-house until the Committee meeting. He also told them the Committee would settle the rate of wages. After some conversation with reference to a scale of work, it was arranged that they should meet again. At a further interview, the Chairman and the Manager offered them 5s. per day; but the workmen refused it. He (the speaker) suggested that the men should go to work at the old rate of wages which had been previously decided by an Arbitrator—viz., 5s. 7½d. per day—until the Committee met, and the whole question was threshed out. Mr. Swallow was the next speaker. He dealt with the terms under which it had been proposed the men should work. They were to be paid according to the Arbitrator's award, as agreed between the Council and the men. They had only been working in the new retort-house a short time before the foreman told them they had the fires to clean. This was putting on extra work. Then in a short time they had 12 more retorts per day to draw and charge. He wished to know where this system was going to end. That was, they were informed, to be a final arrangement—that 48 retorts were to constitute a day's work. Under the Arbitrator's award, they were to carbonize the same bulk of coal as at Sheffield; and the men had accepted this as a basis. The speaker proceeded to describe a further interview between the workmen and the Manager on the wages question; saying a most ridiculous offer had been made to them. The Manager wanted to complicate their work by arranging it in five different sections. He (Mr. Swallow) said it was impossible; and the Manager told them that if they would not do it they would have to clear out. The men who had taken their places had been engaged on the same terms as the stokers had left upon. Had the Manager granted the same terms he had offered to strangers, there would have been no dispute pending. In

* Since this was written, the Company, as will be seen by a paragraph on p. 933, have granted an advance in wages.—ED. J. G. L.

reply to questions, he stated that the notices sent in by the workmen would expire next Thursday morning. Six of the men had already stopped. The strangers were receiving 6s. per day for four retorts less than the old hands received 5s. 7½d. per day for. Mr. Clegg moved a resolution to the effect that the meeting, after hearing the men's statements, thought that they were justified in their demand, and that all ratepayers should support them; and it was passed unanimously. Mr. Grundy proposed—"That this meeting of ratepayers expresses an earnest desire that the Gas Committee will at once meet the representatives of the stokers, to try to come to an amicable settlement," and the motion was carried. Mr. A. J. Bartey (District Secretary of the National Amalgamated Union of Labour) said he believed in men, especially Corporation employees, being fairly and squarely dealt with. He, however, had no desire to agitate the question, and had come to the meeting with the full intention of preaching conciliation. He believed that there was a way out of the difficulty, and that if the Gas Committee would find it they would have the approval of the ratepayers.

At a recent meeting of the Gas Committee of the Oldham Corporation, an application was submitted from Mr. J. R. Clynes, of the Gas Workers and General Labourers' Union, asking, on behalf of all the retort-men employed at the Corporation Gas-Works, for an advance of 6d. per shift in wages, and for payment of the present Sunday rate (time-and-a-half) for three shifts on Sundays instead of for two, as at present. The Gas Manager (Mr. J. Chadwick) stated that when the duration of the shifts was reduced from twelve to eight hours, the men asked to be paid time-and-a-half for the morning and afternoon shifts on Sunday; and this was granted. Now they wanted the evening shift to be paid for at the same rate. Mr. Johnson said the Committee thoroughly investigated this matter a little short of twelve months ago, and had an interview with Mr. Clynes; and the bulk of the Committee thought the retort-men were as well treated in Oldham, both as to hours and wages, as elsewhere. It would be best if, before the matter was discussed by the Committee, the new members (Messrs. Letham, Ward, Crowder, and Lees) were appointed as a Sub-Committee to go into all the details and report to the Committee. Otherwise these four gentlemen could not vote with any degree of knowledge on this complicated question. Mr. Harrop thought the question needed meeting either in the affirmative or the negative; and the proposal was simply an evasion intended to postpone the application to some more convenient date. Mr. Johnson said he was prepared to deal with the matter then. Mr. Chadwick said an application came in July, 1897, for an advance of 1s. per shift; and when this was refused, there was a second application for 6d. per shift. Mr. Letham said the question hinged on this: Were the Committee paying the proper standard rate of wages for this class of labour? Could any official, having gone through the tabulated information obtained from other towns, give any information that would help them? Mr. Chadwick said that from the statements laid before them there was no question as to their paying the standard rate of wages, if there was any standard. There were very few paying more—one or two slightly more, but very few. What they paid was practically about the average; they were not below the average at all. Based on last year's accounts, the increase in expenditure, if the present application were acceded to, would be £3562 per annum. During the year ended March last, the wages of the retort-men amounted to £20,032. An advance of 6d. per man per shift would be equal to 10 per cent., or £2003. The number of retort-men employed during the year varied from 91 to 360 per week, the average being 218. If these men were paid time-and-a-half for the Sunday night shift, it would mean an advance of 2s. 9d. for each of the men on that shift; and in a year's time this would total up to £1558. Mr. Lees asked if they would be able to grant the increase without raising the price of gas. The Chairman (Alderman Gourlay) replied that they must either do so or reduce the reserve fund. The Superintendent (Mr. A. Andrew) said the reserve fund amounted to £45,000, or 10 per cent. on the capital invested in the plant. Mr. Harrop remarked that they were only making between 2 and 3 per cent. on the whole of the money sunk. He moved that the advance of 6d. be granted, as he regarded the retort hands as the hardest worked men under the Corporation. They had applied several times; and he thought they were fairly entitled to consideration. Mr. Chadwick pointed out that the men were not working eight hours at stoking proper, and that between each interval, which came every hour and twenty minutes, they had practically half the time for rest. Some men were quicker at their work than others, and might have 45 minutes, while their fellow-workmen only had 35. It was undoubtedly hard work; but he did not suppose there was more sickness among the stokers than with other workmen. Mr. Lees said he had no desire to be generous with other people's money. He was there to represent the ratepayers; and they had not instructed him to be generous with their funds. He was prepared to move that the matter be referred to a Sub-Committee. Mr. Johnson seconded this; and Mr. Harrop's motion not being seconded, that of Mr. Lees was carried. It was decided that the Sub-Committee should meet on the 24th inst.

It was announced in the "JOURNAL" last week that the stokers in the service of the Yeadon and Guiseley Gas Company had decided to come out on strike in consequence of the refusal by the Directors of their application for an increase of 3s. per week in their wages and the engagement of a "wheeler on" and a "wheeler off" for each shift. The men's notices did not expire till last Tuesday night; but, owing to the dismissal of one of their number by the Manager, they all turned out on the previous Friday. Pending the arrival of some workmen from Scotland, the manufacture of gas was continued with the aid of the yardmen, meter fitters, and other servants in the employ of the Company; but on Monday the quantity of gas in the holders had decreased to such an extent that it was deemed advisable to give notice to the Yeadon, Rawdon, and Guiseley District Councils, as well as to the Menston Parish Council, that the street lamps must not be lighted. This was particularly unfortunate, as the lighting of Menston by gas was only commenced on the previous Saturday, as recorded elsewhere. On Tuesday morning, a contingent of fifteen men arrived and were at once set to work on the manufacture of gas; and every effort was made to provide sufficient gas for the night's consumption. The new men, who were introduced by Mr. Graeme Hunter, were lodged on the works; and the latest news to hand is that they are going on very well.

The stokers in the Greenock Corporation Gas-Works, who lately made an application for an advance in wages of 6d. per shift, have received an increase.

LEEDS CORPORATION GAS SUPPLY.

Stokers' Wages and Hours—Radical Tribute to the Management.

The final meeting of the Leeds Gas Committee for the current municipal year was held last Thursday, at the Municipal Buildings, under the chairmanship of Mr. Joseph Lowden. An exceedingly satisfactory monthly report was presented; the make of gas per ton of coal carbonized being 10,375 cubic feet, as compared with 9626 cubic feet for the corresponding month of last year. The members were informed of the receipt of a letter from the local Secretary of the Gas Workers and General Labourers' Union, asking for an advance of wages for some of the men employed at the gas-works, and for a reduction of working hours for other employees. It was decided to defer the consideration of the application till next month, when the new Committee will be called early together. At the conclusion of the business, a very hearty vote of thanks was accorded to the Chairman for his efficient services during the past year. The resolution was proposed by Mr. H. Brown, seconded by Mr. G. Ratcliffe, and supported by Mr. F. Ambler. The speakers—two Radicals and one Conservative—testified to the successful working of the Gas Department, and likewise bore testimony to the great efficiency displayed by the Chairman, and his uniform courtesy and urbanity. Recognition was also made of the services rendered by the Deputy-Chairman (Alderman M. Walker); the speakers to the resolution being Alderman F. M. Lupton, Mr. A. Smithson, and Mr. Ambler. A third resolution, which was unanimously passed, referred to the management. By this resolution the Committee placed on record their appreciation of the excellent manner in which the General Manager (Mr. R. H. Townsley) had carried out the introduction of mechanical stoking at New Wortley, and the installation of inclined retorts at the Meadow Lane works, as well as other extensions; and also acknowledged the services of the Manager at Meadow Lane (Mr. Tooley) and the Manager at New Wortley (Mr. Bond) for their assistance in bringing these installations to the present satisfactory state of working. Mr. Townsley, in acknowledging the vote of thanks, alluded to the visit of the Corporation to the gas-works on the previous Monday, an account of which appears elsewhere. He said it was somewhat unfortunate that on that occasion there was a slight failure in the working of the retorts. Previously and since they had gone splendidly. There was, he added, no doubt whatever as to the success of the installation. Not only were they obtaining a much larger production of gas from every ton of coal, but they were also effecting a great saving of labour. He was confident that the results in the future would amply justify the action of the Committee in putting down the plant.

BIRMINGHAM CORPORATION GAS SUPPLY.

The Disfranchisement of the Chairman of the Gas Committee.

Early in the past week, a suggestion was made that the unfortunate disqualification of Alderman Pollack, the Chairman of the Gas Committee of the Birmingham Corporation, to which reference was made in the last number of the "JOURNAL," might be remedied by the Council electing him an honorary freeman of the city. A careful examination, however, of the provisions of the Honorary Freedom of Boroughs Act, 1885, showed that there was no remedy in this direction. The "freedom of the city" does not constitute a person elected to it a burgess; it is simply the inscription of his name upon the roll of those who are considered by the Council to have rendered distinguished service. At a special meeting of the Board of Overseers last Tuesday, the subject of the blunder which led to the disqualification was discussed at considerable length. It appears that, in order to clear the register of voters who have died, who have gone to live beyond the prescribed limits, or who for other reasons are ineligible, the political agents send in to the rate office a list of such persons. The list upon which the word "alien" was placed against Alderman Pollack's name was sent in from the offices of the Conservative Association. The greater portion of this list was compiled while Mr. Barton, the Secretary, was incapacitated by serious illness; but it was eventually shown to him. He noticed the name of Maurice Pollack in perusing it, but was under the impression that it related to Alderman Pollack's brother. The matter never again came under notice until the Market Hall section of the burgess list was published, and no one was more surprised at the mistake than Mr. Barton himself. The Overseers passed the following resolution: "The Overseers, having made full inquiry into the circumstances which have led to the omission of the names of Alderman Pollack and Councillor Barrow from the burgess roll, express their great regret. They find that it is largely due to the short time allowed for the preparation of the lists; and they will take all the steps possible in future to prevent the recurrence of such errors."

Oil Gas Enrichment Company, Limited.—The annual report of this Company for the year to the 30th of September states that the balance at the credit of the profit and loss account is £535 19s. 6d., which the Directors recommend be disposed of as follows: To pay the fixed dividend of 5 per cent. on the preference or "A" shares, £250; to wipe off the balance of the preliminary expenses, £162 10s.—leaving to be carried forward to next year, £123 9s. 6d. The Directors regret that the continued fall in the price of cannel coal, and the high price of gas oil, have made it difficult to extend the Company's business. The investments stand in the accounts at cost; but their present value is stated to be £6258 8s. 9d.

Sea Water for Roads, &c.—During the last thirteen years the Yarmouth Town Council have pumped 1000 million gallons of salt water out of the North Sea. This is used for private baths, street watering, flushing drains, and extinguishing fires. Prior to establishing their own sea-water works, the Council used to pay 1s. per 1000 gallons to the Water Company. The cost of their own enterprise is 1½d. per 1000 gallons. During the first few years only 40 million gallons were raised each year; but for the past eight years over 100 million gallons have been pumped and used per annum. Recently the Council decided to spend £3000 in erecting further pumps capable of raising 25,000 gallons per hour, so that the available supply will be doubled. These pumps will be electrically driven by power supplied from the Corporation's generating station.

NORTH SHIELDS WATER-WORKS ARBITRATION.

Tuesday, Oct. 18.

(*Before Sir* DOUGLAS GALTON, K.C.B.)

This was an arbitration to fix the price to be paid by the Tynemouth Corporation for the compulsory acquisition of the North Shields Water Company's works, under the provision of the Act obtained in 1897.

The Counsel engaged were: Mr. BALFOUR BROWNE, Q.C., and Mr. GERALD FITZGERALD for the Company; Mr. FLETCHER MOULTON, Q.C., M.P., and Mr. J. G. WOOD for the Corporation; and Mr. C. A. CRIPPS, Q.C., M.P., and Mr. CLAUDE BAGGALLAY, Q.C., for Earl Percy. Mr. F. R. Y. RADCLIFFE was Legal Assessor.

Mr. BALFOUR BROWNE, in opening the case, said the Company was a very old one, having been formed under an Act of 1786. At that time they contemplated supplying water from certain lands belonging to the then Duke of Northumberland to North Shields and Tynemouth; but instead of purchasing lands from the Duke, they made a bargain, which was contained in the Act, for giving rights to do a great number of things on his land, in return for which they agreed to give him one-seventh of the profits of the undertaking. So that, though the Act said he was not to be regarded as a partner, yet in one sense he was. The limits within which the Company were allowed to supply were the borough of Tynemouth and the townships of Whitley and Monkeaton, and parts adjacent. Two years ago, the Corporation promoted a Bill for the compulsory purchase of the Company's works; and though this Bill was resisted both by the Company and Earl Percy, Parliament passed it. The undertaking was burdened by a very large mortgage debt, which, contrary to the usual custom, was not to be handed over with the undertaking. In another respect, also, the present case differed from others, because, in addition to the claimant Company, the Lord of the Manor whence the supplies were drawn was separately represented. The question to be considered, however, was what the value of the whole undertaking was; and as the figures were practically agreed, there would not be much controversy. The water that the Company took from Earl Percy's estate and many of the original sources, proved inefficient, and some of it unfit for supply, owing principally to hardness, and had to be abandoned. The Company therefore entered into agreements with the Newcastle and Gateshead Water Company, who had mains not far away, and possessed a supply of water far in excess of their wants. Under these agreements, the Newcastle and Gateshead Company now supplied them with about three-quarters of their total quantity. This water was exceedingly good in every way; and the arrangement had the advantage that it saved the Company the necessity of spending large sums on capital account. The manorial water which the Shields Company obtained was pure, but exceedingly hard; and of itself they would hesitate to say it was a good water for a town's supply. The Company therefore mixed it with the Newcastle water at a reservoir constructed for the purpose. There were three agreements between the Companies, one of which expired in 1903, another in 1908, the third being subject to six month's notice. The other side would probably say that the fact that they derived three-fourths of their water under a terminable agreement militated very much against the value of the undertaking. He asserted, however, that, though there was no certainty in law, yet there was in fact, and the Newcastle Company would go on supplying the Shields Company in perpetuity. The net revenue—which would be easily ascertained, since the figures were practically agreed—would have to be capitalized; and the number of years' purchase would depend on the security of that income. The Corporation would say the figure should be low, seeing that the agreements would terminate in nine years; but, on the other hand, if he could show that from one place or another the Company were certain of a supply at all times, they would be in exactly the same position as any other company having their own reservoirs and sources of supply. The price paid to the Newcastle Company was, all round, 3¾d. per 1000 gallons. It might be said that when the agreements expired that Company might exact a much larger figure, and that therefore the profits would be less. First of all, however, the Shields Company had 9⅓ years in which to turn round; and if they had been left alone, they might have done as the Tynemouth Corporation did last year—viz., go to the Font for a fresh supply. If they had threatened to do so, it was quite certain the Newcastle Company would have been only too glad to sell the water at a very moderate rate, rather than lose a customer for the very large amount they supplied now. In fact, the Newcastle Company, when they heard the Tynemouth Corporation were going to the Font, offered to supply them in perpetuity at 4½d. per 1000 gallons. This was in October, 1897, after the Compulsory Purchase Bill had passed, but before the Tynemouth Corporation had introduced their Bill of last session to obtain water from the Font. The very worst the Shields Company could expect, therefore, would be that they would go on paying 3¾d. for the next 9⅓ years, and then 4½d. per 1000 gallons. In their calculations, therefore, they had had regard to this fact, while considering also that the supply was not secured by Act of Parliament. When the Company ceased using some of the manorial water and took that of the Newcastle Company, Parliament, by the Newcastle and Gateshead Water-Works Act of 1870, recognized the new supply. The starting figure in the valuations was the net revenue—viz., £4930 18s. 1d.—which was practically an agreed figure. There was a question as to whether this sum should not be increased by £20, which would make no difference to the Corporation, but was simply a matter as between Earl Percy and the Company. This was really the only matter in dispute between the Earl and the Company. The accountants on the other side brought out the net revenue at £4591, which was due to the fact that £338 19s. 1d. was deducted from the net profit; being the sum spent in resisting the Purchase Bill. He held, however, that the Company were entitled to object to being purchased, and certainly that sum should not be deducted from one year's revenue. Starting with the £4930 the question arose, was that income maintainable? That it was, was clearly shown by the expenditure which the Corporation were undertaking in going to the Font. Then if it was maintainable, the second question arose: How was it to be capitalized? On this point, he said that if the bargain with the Newcastle Company had been (say) confirmed by Parliament, he should have asked the Court to allow 33⅓ years' purchase. The whole question was: What difference were they to make, because it was not a statutory, although a practical, certainty that the Company would continue to receive ample water from the Newcastle and Gateshead Company? Seeing that the offer of the latter Company was to supply at 4½d. per 1000 gallons, it would be wrong to assume that they would continue to get the water at 3¾d. Therefore the Company's valuers claimed on the basis that the present income would continue for nine years, after which time the profit was adjusted by deducting the larger working expenses, or the difference between 3¾d. and 4½d. per 1000 gallons. He asked the Court to allow the multiplier which they thought fairly and properly represented the practical certainty of the Company continuing to get water from the Newcastle Company. From the capital sum so arrived at, the Company's valuers deducted the amount necessary to make the works complete and perfect. Beyond this sum, he claimed an amount for what was erroneously called compulsory purchase. In this case, there was undoubtedly a future before the Company; and, for the prospects which the purchase would take away, and to cover the cost of re-investment, &c., he asked to be idemnified by being allowed 10 per cent. on the capital value of the concern. Another item included in this percentage was the sum which would have to be paid in respect of some debentures which would be liquidated without notice. In conclusion, he briefly referred to the reserve fund and undivided profits, which he stated would remain in the hands of the Company for their benefit.

Mr. FLETCHER MOULTON understood Mr. Balfour Browne to say there was only one question not settled between him and Mr. Cripps on behalf of Earl Percy. The rights of the Company were under a very peculiar Act, and certainly, according to the evidence given in the parliamentary inquiry, there were then questions between Earl Percy and the Water Company which were not settled. He should like to know if Mr. Cripps agreed that the easements which the Water Company acquired under the Act of 1786, for carrying water along pipes placed on manorial lands belonging to Earl Percy, extended, as a right, to water which was not acquired from manorial lands.

Mr. CRIPPS said, so far as Mr. Balfour Browne had opined, he agreed with him; but he was entitled to occupy the position of an independent claimant. As between the Water Company and Earl Percy, save as to the item of £20, he was not aware of any outstanding questions at all. It certainly had been the opinion of the Earl's legal advisers that the rights and easements attaching to the manorial water under the Act of 1786 attached also to the water derived from the Newcastle and Gateshead Water Company. On the one hand, the Company obtained these rights; and, on the other, the Earl obtained corresponding advantage through the seventh of the clear annual profits of the whole undertaking—not only the profits from the manorial water, but the profits from the Newcastle and Gateshead water. When the Court had ascertained what the net annual profits were, he should ask for one-seventh; and the only question that might arise was whether in capitalizing this seventh the Earl had not got a preferential position—whether the seventh should not be capitalized at a higher number of years than the rest of the profits.

Mr. FLETCHER MOULTON asked Mr. Cripps whether he agreed, on behalf of Earl Percy, that the right to carry water in the pipes and to store it in the reservoirs of the Company applied equally to water that was not manorial and to water that was.

Mr. CRIPPS replied that it applied equally to manorial water and the Newcastle water—all the water now supplied by the Shields Company.

Mr. BALFOUR BROWNE said Mr. Cripps meant that, if the Shields Company had gone to the Font, he would not have conceded that they could have taken that water through the pipes on Earl Percy's land.

Mr. FLETCHER MOULTON said what the Arbitrator had to value was what the Company actually possessed; and those rights were now defined by various agreements and Acts. Mr. Cripps's admission could not be considered in valuing the Company's concern, unless it agreed with the legal status of the waters. The clause in the Act of 1786 was very peculiar and went to the root of the valuation. If Mr. Cripps would admit that the Arbitrator was valuing the right to use these mains and reservoirs for all water, wherever it came from, it would simplify the matter; but his limited admission was legally incorrect, and could not therefore be accepted.

Mr. CRIPPS remarked that if Earl Percy had the right to take away the privilege as regarded the Newcastle Company's water, he would not exercise it, because he would never dream of doing away with revenue of which he obtained one-seventh.

Mr. FLETCHER MOULTON read the clause referred to in the North Shields Water-Works Act of 1786, from which he said it appeared that rights were given to take any manorial water and to lay down any pipes and works in the manor lands of the Duke of Northumberland necessary to deal with water derived from manorial sources. He thought it was perfectly clear that the limitation of easements granted by the Act was to water obtained from manorial sources. This was a private, and in no way a public right. In 1870, the Newcastle and Gateshead Water-Works Act was passed. The Company had run short of water, and wanted power to get it from another source. They would not have been entitled to supply it to the people and collect rates for it, however, without authority; and so there was an enabling clause which did not touch the private rights and agreement between Earl Percy and the Company, nor the nature of the easement the Company had over his ground, but simply authorized the Company to supply to the public water "B," instead of water "A." If Earl Percy had claimed payment for the use of the easement for Newcastle water, which he had granted for manorial water, unquestionably he could have exacted it—in fact he did so, for he took one-seventh of the extra revenue. If it was conceded that the Company had the right to pass foreign water through these pipes, paying one-seventh of the profits to Earl Percy, he was perfectly willing to take the valuation on that basis. But all that the Company had a legal right to, and could sell, was the easement of passing Earl Percy's manorial water through that pipe. They had no legal right to pass the Newcastle and Gateshead water through. He raised the question now, because there was going to be another arbitration between Earl Percy and the Corporation, as to what they were to pay for all the easements they were taking under another Act. Earl Percy's advisers were 'cute. They knew perfectly well that the Corporation were bound to go for a new supply, so that the power of passing the Newcastle and Gateshead water through these pipes was of no value to them. They would have to buy an absolute easement to pass whatever water they pleased through the pipes. Earl Percy would then say all he had sold

was the right to pass manorial water; and so the Corporation would have to buy the easement over again. The Arbitrator had to value what the Company had—viz., the right to pass water (which right would be absolutely useless to the Corporation) through the pipes which now existed. Either Earl Percy would agree to the works being valued now with the right to use them for any water—which he (Counsel) was perfectly prepared to accept—in which case they would proceed in the next arbitration on that basis; or the Corporation would buy what the Company had a right to sell, which was the right to employ the works for a perfectly useless water.

Mr. CRIPPS said as between the Company and Earl Percy the position had always been that the Company were entitled, in return for one-seventh of the profit of the whole undertaking, to utilize these manorial rights in respect of both sources of supply. The point raised by Mr. Fletcher Moulton, as to whether the rights granted by Earl Percy extended to water from all sources, did not arise under either of the Acts relating to the present proceedings. What Mr. Moulton was seeking to bring in was what might be the subject of arbitration hereafter, when the Corporation went for the Font supply.

Mr. FLETCHER MOULTON said he would take the legal rights of the Company, which were simply to convey and store manorial water, or the totality of an easement. But that must be by the consent of Earl Percy, because under the Acts as at present existing the only rights the Company had were as to manorial water.

The LEGAL ASSESSOR at this point remarked that the Arbitrator had no power whatever to value anything except what was included under the Act of 1897.

Mr. CRIPPS said if, in order to get rid of legal difficulty and possibly future litigation, he could meet the suggestion of Mr. Fletcher Moulton, he would endeavour to do it.

The following evidence was then called:—

Mr. *Henry Clarke*, examined by Mr. FITZGERALD, said he had been Secretary of the Company since 1873. The Company became a joint-stock concern in 1846, when the capital was fixed at £20,000 in 2000 shares of £10 each. Practically the district now supplied was the parliamentary borough of Tynemouth and the outlying districts of Whitley and Monkseaton, as well as the small township of Murton. The population of Tynemouth was nearly 60,000. Whitley had a winter population of 5000, which was nearly doubled in summer. Additional mains had been laid to meet the requirements of Whitley; but the Company had not yet reaped the full benefit of this expenditure. Monkseaton was also increasing; and the same remark applied here as to Whitley. The manorial water obtained locally—which was exceedingly hard—was supplied mixed with water from the Newcastle Company. The works of the Company consisted of three reservoirs known as the Ridges reservoirs, which were used for supplying the low town section; two reservoirs on Brock Farm in the upper part of North Shields, for the middle section; and the Billy Mill service reservoir, two filter-beds, shaft, and pumping-engine for the higher section; the Whitley springs; and the Marden well. There were also the mains and service-pipes for distributing over the Company's area of about 11 square miles, having a population of some 58,000—the total mileage of pipes being roundly 51 miles—and offices, workmen's houses, &c. Then there were the contracts with the Newcastle and Gateshead Water Company, who could supply 880,000 gallons per day, at an average cost of 3¾d. per 1000 gallons. The total storage capacity of the reservoirs was 60,160,000 gallons—practically sixty days' supply. The quantity of water obtainable from the Company's own works daily averaged 105,000 gallons from the Billy Mill station, and 135,000 gallons from the Whitley springs—a total of 240,000 gallons. About 800,000 gallons daily was being taken from the Newcastle Company. Practically they took what they wanted. The water from that Company was delivered at two points—Holystone and Howdon Dene. Under contracts dated 1882 and 1886, the quantity at the former point was 440,000 gallons daily; and under another agreement, dated 1892, they received further water at the latter point, which had amounted to as much as 500,000 gallons in one day. The Howdon Dene water being at a low level, the Shields Company, in order to utilize it, laid down an engine and plant to pump it to a higher level, where it would be really useful to carry on the supply. The cost of this engine and works was £1687, of which only £181 appeared in the accounts. The Company therefore claimed for the balance. The same remark applied to the large capital expended on mains and services since April last. The mortgage debt totalled £37,297 10s., the bulk of which could only be paid off at six months' notice. The Company were in doubt as to when the notice should be given. If the notice could not be given before the transfer, the Company would have to wait six months before repaying the mortgages; and they claimed indemnification for the loss of the six months' interest, or the cost of inducing the bondholders to accept their money before the expiration of this period. The Company were authorized to charge 1s. 6d. in the pound upon the rateable value. They only, however, made this charge where there was a water-closet; where there was no water-closet, 3d. less was charged. The total rateable value which the Company could legally charge, at 1s. 6d. in the pound, and on which only 1s. 3d. was actually charged, was £45,169. If the full charge were made, the gross increase of income would be £514; or, deducting the actual cost of the additional water at 4d. per 1000 gallons, the further net income not shown in the accounts would be about £250.

Cross-examined by Mr. FLETCHER MOULTON: The Ridges reservoirs were now used to store the Newcastle Howdon Dene supply; they collected no manorial water. Originally the Red Burn water flowed into these reservoirs; but shortly before the use of this water was prohibited by injunction, it was diverted and taken to Whitley. Counsel suggested that the use of the water was forbidden on account of its quality; but witness held that the point as to quality was never raised. The action was settled on a question of law. The land on which the Ridges reservoirs were built was held in two pieces—one under the Act of 1786, and the other under an agreement of 1814. Under the latter, a rent of £15 was paid; but this ceased after an action in 1885 as to the mode of striking the one-seventh of the profits, following which an adjustment took place. In the same way, the rent of Brock Farm ceased to be payable. The Brock reservoir was fed now with water from Howdon Dene, so that that reservoir had nothing to do with manorial water. There was a source of manorial water at the Billy Mill reservoir—a shaft 360 feet deep; and water also flowed into the reservoir from Holystone. A rent or acknowledgment of £20 a year was paid in respect of Billy Mill to Earl Percy's agent.

Mr. BALFOUR BROWNE remarked that this was the £20 which the Company said they should not pay, and regarding which they had not yet settled with Earl Percy.

Witness, in further cross-examination, said he knew nothing of the arrangement under which this £20 was paid. The Whitley reservoir was an old limestone quarry. The water there came from a spring in the reservoir, and from Marden well. This water was pumped at Whitley to the Billy Mill reservoir; and from the connecting main distribution went on. No filtration of this water took place before reaching Billy Mill, except in the case of the Marden water, which passed through a filter of sand and limestone before it entered the Whitley reservoir. The area of the Whitley works was held, part under the Act of 1786, and part under an agreement of 1861. Under the agreement, which was terminable on either side at six months' notice, a rent of £45 was payable.

Mr. FLETCHER MOULTON also handed in the agreement showing that Brock Farm was held at six months' notice, and at a rent of £37 10s.

Cross-examination continued: Until 1882, the water supplied by the Company was all local. Under the 1882 agreement with the Newcastle Company, the North Shields Company could take 15 million gallons at 4d. per 1000 gallons; and if more were wanted, the price was fixed.

Mr. FITZGERALD: They were not obliged to furnish you with any amount if it interfered with their own supply?

Witness: There is a clause to that effect.

They were prohibited also, by statute, from supplying to your Company in any year in which they did not keep 200 million gallons of water between May 1 and Sept. 30?—Yes; down to the repeal by a subsequent Act of the Newcastle and Gateshead Company in 1889.

In further cross-examination, witness said that the next agreement, dated Sept. 13, 1896, was for 12 million gallons monthly, at a cost of £150 a month, whether the water was taken or not; the charge for any in excess being 3d. per 1000 gallons. There was a restriction under which, whenever the Newcastle Company's reservoirs contained less than 800 million and more than 700 million gallons, they should not, unless they chose, be compelled to supply more than 9 million gallons per calendar month. Then there was a sliding-scale under which, if the reservoirs contained less than 500 million gallons, they were free from obligation to supply. The price of 4d. per 1000 gallons for the excess water under the old agreement was cancelled by this agreement, and put at 3d. The prices actually paid for water were: 15 million gallons at 4d.; all the water under the second agreement, 3d.; and the 440,000 gallons under the 1892 agreement, 4d.

Mr. FITZGERALD: Although there was an agreement whereby you were to pay 3d. per 1000 gallons, the Newcastle Company would not supply you excepting at 4d.?

Witness: On the 1892 agreement it was arranged for at 4d.

Although there was an existing agreement fixing the price at 3d.?—We have already stated that. I cannot say anything more.

They were able to name their price?—Yes; after negotiation we agreed to their price of 4d.

You are wholly unable to perform your duties unless you get the assistance of the Newcastle Company?—We would not have gone to the Newcastle Company if we could have done without them.

You could only supply one-fourth of the water required if it were not for that Company?—Certainly.

The one-fourth you get from local sources would not be fit to supply, if it was not mixed with the Newcastle water?—It is not a first-class water alone. I cannot say it is not fit to be supplied. We have to use it because we cannot do without it.

Do the Company say this is water fit to be supplied for domestic purposes by itself?—It is not a first-class water; we must mix it. If we supply it by itself, it is so hard.

The Whitley Quarry reservoir has 94 grains of salt to the gallon, has it not?—It is saline, certainly.

Perceptibly saline?—No; but on analysis the saline shows largely.

The Billy Mill water has sulphuretted hydrogen in it, has it not?—The sulphates are present in it.

Sulphuretted hydrogen that can be smelt?—Yes; there is an odour of it. But it is perfectly eliminated when the water is filtered. At the pump-head, it is perceptible. No drainage, so far as I am aware, goes into it.

Witness was then taken to several local Acts, which he agreed afforded protection to the Newcastle people by excusing the Newcastle Company from supplying the Shields Company in times of pressure.

Mr. FITZGERALD: One quarter of the water you supply comes from local sources?

Witness: Yes.

The whole of the remainder is liable to be cut off in times of serious drought?—Then everybody would be alike.

In times of serious drought?—It would be so.

Very well; and half of the remainder is purely an optional supply?—It is optional. But we have no reason to distrust them.

So that if they get a better customer, they could leave you in the lurch?—They could, if water companies ever do such a thing as drop hundreds of pounds a year. The engine referred to is for the purpose of raising to a higher level water obtained from the Newcastle Company.

Re-examined by Mr. BALFOUR BROWNE: With regard to the pumps and mains laid last year, any increased revenue from them did not appear in the accounts because it had come in since they were made out. As to the suggestion that without the pumps to raise the Newcastle water they could not have performed their duties, it was a fact that the previous year they did do so without the pumps. As they had received no revenue from those pumps, a claim on the Corporation was made. Whitley water was being supplied absolutely direct to the consumers, unmixed, because the main from Whitley was used both as a supply and raising main. The analysis which the Company had of the mixed water showed that it was good potable water for domestic consumption.

Mr. BALFOUR BROWNE: As to the agreement with the Newcastle Company, my learned friend suggests that you are precluded from getting the water just at a time when you require it most. Do you think that the water in the large reservoir of the Newcastle Company will ever be so reduced as to make it necessary for them to stop supplying it?

Witness: If it is, it will be at a time of general water famine.

As a fact, the storage of the whole system of the Newcastle Company will be 5000 million gallons when the Catclough reservoir is completed?—That is so.

Wednesday, Oct. 19.

It had been arranged at the close of the first day to commence this morning at 10.30; and at that hour the parties assembled. From that time, however, till nearly 1 o'clock, Counsel for the Corporation were engaged privately in consultation with the Counsel for the Company and Earl Percy. The principal witnesses were also summoned to the conference; the Arbitrator being assured, on more than one occasion, that the delay would certainly result in shortening the proceedings, and might lead to practical agreement. An adjournment was at length taken till 2 o'clock, when, on the parties re-assembling,

Mr. Fletcher Moulton said: My learned friends and myself have been utilizing the time this morning in an endeavour to come to an amicable settlement; and I am happy to say that there is every prospect of it succeeding. In fact, an arrangement has been offered by my friends Mr. Balfour Browne and Mr. Cripps to my clients which all their representatives here are prepared to advise should be accepted. I am glad to say it settles many other things besides those that are formally included in this arbitration; and therefore it is necessary that my clients' representatives should go back to their Council for formal authority to accept it. We therefore ask you to adjourn the arbitration *sine die*. The exact form of the settlement will be, I think, a matter for Counsel to consider, because it may be that one method of carrying it out will involve less legal difficulty than another. But as the nature of the settlement is agreed, the actual formal manner in which it is carried out will not be a serious question. I make this request with the more certainty of its being accepted from the fact that my clients bear all the costs of the arbitration, and so anything that would cause greater expense would come on them. They are sure, therefore, not needlessly to ask for an adjournment.

Mr. Balfour Browne said they had arrived at a settlement which would embrace perhaps even more than had been fully discussed. He believed that the Corporation would endorse the views of the Committee who were instructing Mr. Moulton. It was really only a formal adjournment they were asking. Probably when they had put into writing the terms which were agreed, the award might be made as an agreed award.

Mr. Fletcher Moulton thought that would probably be best. Perhaps it would be better to appoint the present Arbitrator as Arbitrator also under the other Act, and have the award under both.

Mr. Cripps, speaking for Earl Percy, quite endorsed what Mr. Fletcher Moulton and Mr. Balfour Browne had said, that the subject was a mere point of form, the matters being agreed. He thought it would probably be best to enlarge the Arbitrator's power so as to make his award settle all the matters between the parties.

The proceedings were then adjourned *sine die*.

THE PROPOSED PURCHASE OF THE FALMOUTH GAS AND WATER WORKS BY THE CORPORATION.

Mr. Silverthorne's Report.

In anticipation of the statutory meeting of ratepayers to consider the proposal of the Falmouth Corporation to purchase the gas and water undertakings, there has been circulated in the borough the report which Mr. A. Silverthorne has made to the Corporation on the scheme. The report is prefaced by a brief note by the Mayor (Mr. C. Deeble), in which he says that he and other members of the Corporation in favour of the scheme believe it will be to the advantage of Falmouth and lead to a reduction of the rates.

Mr. Silverthorne expresses the opinion that the purchase of the two undertakings will be a perfectly safe investment of municipal funds, which will relieve the rates, and greatly add to the sanitary interests of both Falmouth and Penryn. In the ratepayers' interest, questions of value sometimes cannot be treated as fully as desirable, because of inducing inflated demands on the part of the sellers; but in this case there appears to be no reason for keeping anything back from the ratepayers—the Gas Company having already raised claims for which there can be no justification whatever, "and which they will never establish should they ultimately prefer arbitration to negotiation." Both the gas and the water undertakings are paying concerns, and will come under the head of productive assets. There are a large number of precedents of cases in which such undertakings have been acquired by the ratepayers—some comparatively recent—which have given perfectly satisfactory results to the purchasers. The one instance opposed to this is the Cowes case, and that has been seized upon to raise a claim for £60,000 for the Falmouth Gas-Works, which is perfectly ridiculous.

The usual advantages appertaining to the purchase of gas-works are described by Mr. Silverthorne as reductions in price, relief of rates, redemption of capital, abolition of meter-rents, and reduction of expenses in public lighting. This class of undertaking is purchased absolutely on its invested capital. This is £13,500 in the case of Falmouth. There may be some difference of opinion as to what the £1 shares of the Company have fetched when totally uninfluenced by prospects of purchase; but Mr. Silverthorne contents himself by indicating that at £2 14s. each, at which a considerable number of shares changed hands early this year, the value of the undertaking could not exceed £36,460. The opinion expressed in his report of October, 1896, that the undertaking is not worth more than £33,750 is, however, strengthened by the circumstance that the Company have lately introduced a water-gas plant. This is a tacit admission that they are unable much longer to go on supplying ordinary coal gas with safety, upon the resources of their undertaking. It would have paid the Company to remove their works; and it will eventually pay the Corporation even better to remove them, because they will be able to take advantage of the cheapness of money. One reason why the works afford an advantageous purchase is because they are not over-capitalized; but they should not on this account be paid for on the footing that they are fully equipped to go on, just because the Company have been advised from London to put up a water-gas plant to eke out their existence in their present situation. The supply of water gas in a locality like Falmouth is most undesirable. The total profits of the Company were £2034 in 1895, £2353 in 1896, £1941 in 1897, and £1319 in 1898. The depreciation of the profits last year was chiefly due to extensions and the erection of the water-gas plant. Under normal conditions, there should be a profit of £2536 with gas at 3s. 4d. per 1000 cubic feet, inasmuch as in 1899 his estimate that the sale of gas would reach 34 million cubic feet is clearly about to be realized. Interest on the purchase-money (£36,450) at 3 per cent., and the amount necessary for the sinking fund to extinguish the debt in forty years, would come to £1574 annually; leaving a margin of about £1000 net profit on the present price of gas. Mr. Silverthorne explains, however, that he never contemplated that £1000 should be made out of the works, and 3s. 4d. per 1000 cubic feet is too high a price to be charged to consumers.

The purchase of the water-works is desirable because Falmouth depends entirely on maintaining a high reputation for sanitation and water supply. The Falmouth water is evidently of the highest purity, and without the least contamination at its sources; and there is no evidence that the pollution which exists cannot be entirely removed by care and attention. Municipal control could alone keep the supply permanently above suspicion. The present reservoir is too small to deal with the increasing supply of a district of 16,000 inhabitants. The watersheds of the two feeders are capable of contributing a daily supply of a million gallons to Falmouth and Penryn, but not upon the present capacity of the reservoir. The ordinary and preference stock of the Company amounts to £37,500; and the mortgage and mortgage debentures, to £8750. If it be possible to acquire the works either by negotiation or compulsorily, a better opportunity than the present for acquiring them upon reasonable terms will never occur. The Company have paid no dividends on the ordinary stock for two years, and the present outlay on filtration works, and prospective expenditure on reservoirs, mains, &c., may prevent them for some years reaching the maximum dividend on the ordinary stock. The Company have besides an unexhausted capital amounting to £33,500, which may be issued as the ordinary stock or as preference stock at a maximum dividend of 6 per cent. A time must be reached, as the undertaking develops more revenue and requires further outlays of capital, when the dividends paid will be greater in amount, and the proportionate cost of acquiring the works far in excess of what it would be now. The present value of the stocks on a liberal computation is £52,125; and in addition there are loans amounting to £8750 which would have to be taken over. The amount required for interest and repayment over a term of sixty years is £2454. Allowing the benefit of the saving due to the abolition of Directors' fees, commission, and London charges, the amount would be £2552. This admits of the Corporation making a small surplus, to which should be added the increase in revenue, which is 3 per cent. per annum, by the time the purchase could be carried out. This would, however, be sunk in the reduction in rental, consequent on the transfer of charges from the rental to the net rateable basis. No rate-in-aid should be needed from this loss of rental. On the contrary, a slight relief of rates should result from the different basis of charge.

In conclusion, Mr. Silverthorne sums up the result of the purchase of both undertakings. The net income which the Corporation would receive from the profits on the gas and water would be £5088. The liabilities are as follows:—

	Purchase-Money.		Interest.		Sinking Fund.
Gas	£36,450 at 3 p.c.	..	£1,094	..	£481 (40 years)
Water	52,125 „	..	1,563	..	459 (50 years)
Water loans.	8,750	..	355	..	77 (50 years)
	£97,325		£3,012	..	£1,017

On the basis of this calculation, the Corporation would, Mr. Silverthorne says, have a net annual surplus profit of £1059. The cost of the Act would be about ten annual payments of £156. Surplus profits on the water would probably be devoted to the reduction of water-rates. As to the gas, the consumption doubles in nineteen years; and the Corporation would have at the end of this period a further developed source of profit equal to about £1600 per annum. The idea that such undertakings cannot be as well managed by corporation committees as by boards of directors is a perfect misconception; and a great injustice to their managers, who are chiefly responsible in either case. The purchase of the two undertakings is explained as a financial measure calculated to ensure the ratepayers against risk of loss. If they should not succeed in getting parliamentary sanction for the purchase of the water undertaking, the whole of the costs would, if it were taken singly, fall upon the ratepayers. With a joint scheme this cannot happen, as under their Act of 1890 the Gas Company are obliged to sell; and the costs of the Bill will be borrowed on short loan.

The Public Lighting of Downham Market.—The lighting controversy at Downham Market is now ended, and the streets of that brisk little Norfolk town will in future be lighted by paraffin lamps. The Gas Company, it may be remembered, wished to increase the contract price for the public lamps; and the Council declined to agree. The new lamps are reported to be very good of their kind; while the cost for oil is said to compare favourably with that for gas.

Heywood and Middleton Joint Water Board.—Last Wednesday the first meeting of the newly-established Heywood and Middleton Joint Water Board was held at Heywood. Prior to the formation of this Board, the Heywood Town Council have been the owners of the water-works in the Nayden Valley; and their area of supply has included Middleton and other places. In the last session of Parliament, Heywood promoted a Water Bill; and as the result of negotiations between the Councils of the two boroughs, it was agreed to insert in the Bill clauses providing for the formation of a Water Board (consisting of six representatives of each Council), in which the Heywood water undertaking should be vested, and by which its affairs should be controlled. There was not much business to be transacted at the first meeting of the new authority; but Mr. Sutcliffe Firth, Chairman of the Heywood Water and Baths Committee, was elected the first Chairman, and Mr. J. Aspell, of Middleton, the Vice-Chairman. The meetings of the Board will be held alternately at Heywood and Middleton.

SALES OF STOCKS AND SHARES.

At the Mart, Tokenhouse Yard, last Tuesday, Mr. Alfred Richards conducted a sale of debenture and ordinary gas and water stocks and shares, mostly by order of the Directors of the several Companies. The first lots submitted for competition consisted of £10 shares in the Southend Water Company, ranking for a maximum dividend of 7 per cent.; the dividend for the year ending Dec. 31 last having been at the rate of 5½ per cent. per annum. The prices averaged £16 3s. 1d. per share, yielding upon the investment £3 8s. per cent.; the total amount realized being £8077 10s. The next lots consisted of the new issue of 4 per cent. perpetual debenture stock by the Directors of the Alliance and Dublin Consumers' Gas Company, already referred to in the "JOURNAL." The whole of the stock was not disposed of; but that which was sold realized £120 per £100 of stock, yielding the purchaser £3 6s. 8d. per cent. Some £10 "A" shares in the Walton-on-Thames and Weybridge Gas Company, bearing 7 per cent. dividend, were sold (by order of executors) at an average of £16 10s. 1d. apiece; producing £4 4s. 10d. per cent. A new issue, by order of the Directors, of ordinary stock of the Plymouth and Stonehouse Gas Company, bearing 6½ per cent., was next offered; and a large proportion of it was disposed of at £150 per £100 of stock—returning the purchaser £4 1s. 8d. per cent. The last lots were £10 shares in the Hampton Court Gas Company, bearing 7 per cent. dividend. These were sold by order of executors, and fetched, on an average, £17 3s. each; giving the purchaser £4 1s. 7d. per cent. upon his investment.

Among other recent sales of shares, the following may be noted: At Tamworth yesterday week, 275 £2 shares (£1 15s. paid) in the Fazeley Gas Company were sold at prices ranging from £2 5s. to £2 8s. each. In order to meet the cost of an extension of the mains, the Directors of the Marlow Gas Company, Limited, decided to issue £2500 of new capital (7 per cent.) in £10 shares. These were offered for sale by auction by Messrs. Lawrence and Son, at the Crown Hotel, on the above-named day. The prices per share ranged from £11 5s. to £12 2s. 6d.; the average being about £11 9s. The remaining 775 new ordinary shares of the Airdrie and Coatbridge Water Company, authorized to be issued under the Airdrie and Coatbridge Water Company's Amendment Act, 1892, were offered for sale in the Airdrie Burgh Court Hall last Tuesday. The shares, which were £10 each, and put up at 10 per cent. above par, were sold in lots of 20. The average price realized was £13 16s. 3d. per share; being a decrease of 9d. on the average of the previous sale. Recently 60 £10 shares (7 per cent., but now, under the sliding-scale, carrying 9 per cent.) in the Bideford Gas Company were sold at an average of £18 15s. 6d. each. At Winchester, ten original shares of £25 each in the Winchester Water and Gas Company were lately disposed of for £61 apiece; five similar shares fetching £60 each.

THE LONDON COUNTY COUNCIL AND THE WATER SUPPLY.

Proposed Purchase of the Water Companies' Undertakings.

The following are the recommendations of the Water Committee of the London County Council, forming the conclusions of a report to be considered at the meeting of the Council next Tuesday. They are dealt with in our article on "Water and Sanitary Affairs":—

1.—That a Bill be promoted in the coming session of Parliament for the purchase by the Council of the undertakings of the eight Metropolitan Water Companies, by agreement, or failing agreement by compulsion.

2.—That, subject to such provision as may be made by Parliament as to the ultimate relationship between London and the outside authorities, provision be made for the undertakings of the Companies vesting in the Council at a date not later than six months after the passing of the Act.

3.—That the Bill contain provisions authorizing the Council to proceed forthwith with the connecting and laying of mains and other works necessary in order to enable it to protect any part of the Metropolis from want of water.

4.—That the arbitration clause be so framed as to render it certain that in the case of each Company the arbitrator will have regard to all such circumstances as may be brought before him, and that no allowance shall be made in respect of compulsory sale except for cost of reinvestment (if any).

5.—That, subject to further negotiation thereon with the Local Authorities, the clauses with respect to the supply of outside areas should follow the principle of the Bills promoted by the Council in 1895.

6.—That the understanding with the Corporation of the City of London, with regard to their representation on the Water Committee, be adhered to, if they so desire.

7.—That a Bill (or Bills) be promoted in the coming session of Parliament for the purpose of empowering the Council to bring an additional supply of water to London from the watersheds of the Wye and Towy on the general lines of the report of the Water Committee approved by the Council, April 21, 1896, in so far as it applies to the Wye section of the Engineer's scheme.

8.—That it be referred to the Parliamentary Committee to prepare and present to the Council the necessary Bills for carrying out the above resolutions.

Unaccounted-for Gas at Huddersfield.—Some time ago, Mr. Barras, a member of the Huddersfield Corporation, made a statement to the effect that the average leakage of gas amounted to more than 20 per cent. At the meeting of the Town Council last Wednesday, the Chairman of the Gas Committee (Alderman Stocks) called attention to the matter. He reminded the Council that at the time he stoutly denied the statement, which he expected would have been withdrawn. He said he had recently made inquiries of the Gas Manager (Mr. E. A. Harman), and he had found that the average leakage was only 8½ per cent., which was a very favourable comparison with other large towns. Mr. Barras said he did not intend to withdraw the statement, and in support of it he submitted figures to the Council, which, he said, proved the leakage to be about 20 per cent. of the quantity manufactured. He would, however, return to the subject at an early date with fresh facts. Alderman Stocks said it only remained for him to declare that Mr. Barras's statement was untrue, and that the leakage of 8½ per cent. was the exact quantity.

ELECTRIC LIGHTING NOTES.

The Local Government Board have declined to receive a deputation from Bury St. Edmunds as to re-opening the question of electric lighting in the borough. After holding a public inquiry, the Board decided not to sanction a loan of £20,000 for electric lighting purposes. A modified scheme was suggested; but it did not find favour with the Town Council, who reverted to the original scheme. In the hope of urging its advantages, the deputation had been appointed with the view of obtaining an interview with the Board.

Singularly enough, Brighton was not the only place put to inconvenience last week by the failure of the electric light. On Wednesday night and Thursday morning, one side of almost the whole area over which the electric lamps supply the public lighting of Dublin was in partial darkness. The appearance of the principal thoroughfares was very gloomy. The absence of the usual amount of electric light is attributed to the relaying of cables, which necessitate the non-working of some circuits during the operations.

"May I be allowed to inquire how long the inhabitants of this part of the city are likely to be annoyed, and their property damaged, by the immense clouds of dense black smoke which are being poured forth in such volumes from the chimney-stack of the electric light works?" So writes an aggrieved resident of Exeter to one of the local papers. His complaint shows that London is not the only place in which electric light works have come into disagreeable prominence as polluters of the atmosphere. The writer is of opinion that "in any other place such an exhibition as we are daily being subjected to would not be tolerated," which proves that either his faith in municipal management outside Exeter is large, or that his knowledge of other places is small."

A step has been taken by the Huddersfield Corporation the result of which will be awaited with considerable interest. The General Purposes Committee (which consists of the whole Council) have instructed the Borough Engineer, the Water Manager, the Electrical Engineer, and the Tramways Manager to report upon the practicability of utilizing the water of the Corporation works in the Wessenden Valley, seven miles from Huddersfield, for the purpose of generating electricity for traction or lighting purposes. They have given those officials power to obtain such expert opinions as they, in consultation with the Mayor and Town Clerk, may deem necessary. A few months since Sheffield was making a similar investigation; and the conclusions then arrived at might be useful to Huddersfield.

On Sunday, the 9th inst., there was an extinction of the electric light at Oldham just before six o'clock in the evening; and it lasted for about twenty minutes. It appears that the current had been turned on, when a man in charge at the supply station switched it off, and must have lost himself, for he could not again get the supply along the particular cable. After a few minutes, he went for the Chief Electrical Engineer (Mr. S. W. Newington), who soon put the matter right. In the meantime, much inconvenience was felt at the various churches and other places lighted by electricity. At public-houses where this illuminant had been introduced, and the gas-brackets removed, the inconvenience for the time being was the greatest. In referring to this matter a local paper says: "This shows that it is not wise to solely depend upon electricity, either as a lighting medium or for power purposes."

One by one the towns in the West of England are receiving the attention of the promoters of electric lighting schemes. The latest to be so honoured is the quaint old borough of Totnes. A firm of electrical engineers in Westminster have entered into a contract to purchase the Town Mills and buildings, with the intention of obtaining a Provisional Order for the supply of electricity in the town. In communicating this information to the Town Council, they asked that body to not only give the scheme their hearty support, but to undertake not to oppose their application for a reasonable time, in order to enable them to apply with greater confidence to Parliament. The Council decided to consent to the application on terms to be arranged. The Mayor (Mr. R. W. Hayman) remarked that the Gas Company had done their best to give the town a good light; but it was useless to oppose the introduction of electricity. Mr. Kellock, a Director of the Gas Company, assented, and expressed the opinion that there was room for both illuminants.

With a view to satisfying the users of electric light at Cape Town that they have not been greatly overcharged for the last winter's consumption, the Town Council have directed the preparation of an elaborate return, showing the electric current generated and sent out. It is to give the quantity of electrical energy sent from the generating stations every 24 hours, the quantity received at the battery with the percentage of loss in transit, the quantity sent from the battery station to the street-lighting system and to private consumers, with monthly statements of the total debited to the Council and to private consumers. The return is to apply to the four winter months of May, June, July, and August in each of the three years 1896-8. It is to be hoped the consumers will be satisfied when they have it. The object of requiring the return for previous years as well as this one is, of course, to test the truth of the allegation that the consumers' meters formerly in use registered less than the actual quantity. As the number of consumers and lamps has greatly increased, the process of checking the individual account from the gross consumption will be an elaborate one. On June 30, 1896, there were 203 consumers, with a total of 8000 8-candle power lamps or their equivalent; by June 30, 1897, the consumers had increased to 275, and the lamps to 13,000; and on June 30 last there were 360 consumers and 16,000 lamps in use.

Last Tuesday was an eventful day in Belfast, inasmuch as it witnessed the laying of the foundation stone of the New City Hall, on the site of the Linen Hall in Donegall Square, and the opening of the new electric light station—both functions being performed by his Excellency the Lord Lieutenant of Ireland (the Earl of Cadogan). The old station being found inadequate, a site for a new one was obtained in the Lagan Bank Road, where a building has been erected to contain machinery equal to 1000-horse power; the station being large enough for five times this power. The entire site will be equal to 20,000-horse power. The whole scheme has been devised by Mr. V. A. H. M'Cowen, the Chief Electrical Engineer to the Corporation. In the engine-house are three sets of Belliss-Parker steam dynamos—two of 100, and two of 200 kilowatts; while the boiler-house is arranged to take ten Lancashire boilers, 30 ft. by 8 ft., four of which are at present erected and working. The current

is distributed on the three-wire low-tension system, 440 volts between the outer wires, or 220 volts between the outer and the middle wire. The most distant point supplied is about 2¼ miles from the generating station. There is at present an equivalent of 29,000 8-candle lamps connected to the mains, including 150-horse power in motors; and applications have been received for an equivalent of 8000 similar lamps in addition. The Brighton system of charging for the current has been in operation since July 1.

More complaints were made at the Hampstead Vestry on Thursday about the eccentric conduct of the electric arc lamps in the High Street. This time the reason given by the Engineer was that the current was generated by a new dynamo which was not in thorough working order. Several members instanced other occasions when the electric lamps refused to give light; but Sir Henry Harben, the Chairman of the Vestry, practically stopped further discussion by vehemently deprecating these public admissions of the failure of the electric lighting plant. As a trading concern, he argued, it was unwise, and was comparable to a bird fouling its own nest. The Engineer should always be consulted on such matters. During the discussion on a recommendation that 28 additional gas-lamps should be affixed in certain scheduled thoroughfares, a member suggested that the incandescent system should be tried; but Sir Henry pointed out that this subject had already been considered. The Committee reported that during September 47 consumers were connected, representing 2840 8-candle lamps; making a total of 71,367 8-candle lamps in use. Several ratepayers have complained that the rural aspect of Haverstock Hill would be entirely spoilt if any further cutting away of the foliage of the trees in immediate proximity to the arc lamps were allowed. The Vestry decided that no further cuttings should be made. The bad position of the lamps is responsible for this latest trouble.

The following appeared in last Friday's "Daily Telegraph": "A sensation was caused at Brighton last night by the sudden failure of the electric light service. The stoppage was only temporary—beginning at ten minutes past nine o'clock, and lasting for twenty minutes. During that period, however, Brighton had a unique experience. For the first time on record, its magnificent sea-front was in darkness save for the gas-lamps always kept burning outside the Old Ship Hotel and the Alhambra, the electric lights over the portico of the Hôtel Métropole (which has an independent installation), and the lanterns dimly burning of the line of cabs on the ranks on the seaward side of the King's Road and Marine Parade. On the West Pier, some gas-lights also helped to break the darkness; otherwise the only lights visible were the lines of lamps that illuminate the Hove quarter. The contrast between the gloom of a rainy night and the brilliant illumination which makes the Brighton front as bright by night as by day, was extremely striking, owing to the energetic management that the Corporation have bestowed on their electric installation. Not only the King's Road and Marine Parade—in other words, about three miles of the sea-front—have been provided with an electric illumination, but the main arteries of the town, including North Street, Queen's Road, West Street, the valley of the town, and many of the tributary streets in all parts of the borough have been furnished with the new illuminant, conveyed partly through the lamps formerly used for gas, but in the main by lofty standards. In a great number of public-houses, hotels, and private residences, electricity has also been introduced, as well as in all the theatres and music halls. The surprise caused when the light suddenly grew dim, and then became extinguished altogether, was accordingly widespread. The inconvenience that resulted was felt chiefly in the private houses where, the electric light having been furnished, the fittings for gas had been discarded. In the theatres and music halls, the managements have in all cases retained the use of gas as well as employing electricity. This precaution, fortunately, was the means of averting any possible cause for alarm. In the public-houses, candles were promptly pressed into service, and business went on as usual amid considerable merriment."

The subject of "Municipal Corporations and Electric Lighting" was discussed at the autumn meeting of the Association of Municipal Corporations, held at the Westminster Palace Hotel last Wednesday. It came up on a motion submitted by the Mayor of Nottingham, in the following terms: "That this Association affirms the principle that where local authorities have, with the sanction of Parliament, established undertakings for public benefit, and have not failed in the performance of their duties, it is not right or expedient that powers should be granted to companies to compete with such local authorities." He remarked that while the municipal authorities were manifesting a growing desire to undertake the responsibility of lighting their towns by electricity, the Bill promoted by the General Power Distributing Company must have startled many of them; and they must have been still more surprised that a Committee of that House of Parliament which some of them were accustomed to regard as the one which could be relied upon to protect the rights of property and of Corporations, had passed the Bill. It applied to a large and populous area, comprising some 2000 square miles in the Midland district, including in its limits the cities of Lincoln, Sheffield, and Nottingham; and it proposed to allow a Company to supply electricity in that area without any Order or proceedings of the Board of Trade; to compete in Sheffield, Lincoln, and Nottingham with the Corporations of those cities; and to compete not only with those municipal bodies which had already obtained the power to supply electricity, but also with those who might hereafter obtain such powers. It was wrong and vicious in principle that the settled practice of Parliament should be set aside in favour of a particular Company by a Private Bill. The question was of importance to all municipal authorities, for, if the Bill passed into law, it would establish a precedent that would quickly be followed in regard to other districts, and its evil effects would be felt throughout the country; but if the public authorities represented in the Association were united and determined in their opposition, they possessed the power to defeat the measure. The Lord Mayor of Sheffield seconded the proposition; and it was carried unanimously. The matter was referred to the Council of the Association, with the view of opposition to the Bill being organized.

Incandescent Lighting at Gravesend.—By twelve votes to six, the Gravesend Town Council have passed a resolution instructing the Paving, Lighting, and Watch Committee to make arrangements for lighting the streets with incandescent gas-burners.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The subject of the supply of water-pipes from America to the Glasgow Corporation is not out of sight yet, and is not likely to be for some time. It was mentioned at a meeting of the Town Council on Thursday, when one of the members asked whether it was true that Messrs. Wood and Co., of Philadelphia, were likely to be unable to fulfil their contract. The reply given by Mr. Osborne, the Convener, was that there had been correspondence with Messrs. Wood, from which it appeared that there was a possibility of their not being able to deliver the pipes within the contract time. If this should happen, the Committee would be put to great inconvenience. The Committee wished power, in this event, to fall back upon the offer of Messrs. M'Laren and Co., of Glasgow. This power was granted. I observe that a town councillor, speaking at one of the ward meetings, stated that he voted for the acceptance of the American tender in order to break up a ring of pipe manufacturers in Glasgow, who were sweating the ratepayers; and that it had had effect, for a contract had been signed for 5000 tons of pipes at a rate 15s. per ton cheaper than the price paid to the American firm.

At this season the air resounds with the voice of the municipal candidate, whose number is legion. The most conspicuous of these speakers this week was Treasurer Williamson, of Peebles, who explained to the electors on Monday night the position of the gas question in that town. Mr. Williamson has been the soul of the movement for the transfer of the gas undertaking to the Corporation. He deserves to have it recorded of him that he has managed the matter with the most consummate skill and ability. There was a threatened danger, at first, of his endeavouring to unduly depreciate the Gas Company's undertaking; but it is altogether to his credit that, whenever facts were placed before him, he accepted them without reserve, and that he has since striven, with success, to promote an agreement which is without doubt fair to both parties. One other meritorious feature of his action is that, in the course of the process of informing himself upon gas subjects, he has procured, at what must have been great trouble and cost to himself, the most reliable information obtainable with reference to the prices paid in other transfers. It was these that he chiefly dealt with in his address to the electors. He brought out that, while in Peebles the proposed price would be at the rate of £1000 for every million cubic feet of gas sold, in Dunfermline the price was at the rate of £1700 per million; and that, while in Peebles they were to redeem their mortgages at the rate of £157 10s. per £100 of stock, in Edinburgh the redemption of annuities was fixed at the rate of £285 per £100. Mr. Williamson made out his case, that they were getting the gas undertaking upon terms which were more favourable than any that he knew of. The ratepayers are likely to homologate his action. If all goes well the transfer will be the cheapest on record. For one thing, the Corporation have not gone the length of even taking the advice of a gas expert on the matter. Mr. Williamson was asked about this, and his reply was that in Mr. W. Young, of their own town, they had an expert than whom there was no better in Britain. Mr. Young is a Director of the Gas Company; but they were satisfied that he met them in a fair, upright, and honest spirit, and gave them admirable counsel. This tribute to Mr. Young is one which everybody will endorse.

In Dundee, one of the subjects before the electors is the extension of the Corporation Gas-Works. Speaking on this question, Mr. Longair, who is at present in the Town Council, said that while Dundee was fighting for its commercial existence, he was not one of those who thought that the city had no future before it. During the past six months, 17 million cubic feet more of gas was made than in the summer six months of last year. They might therefore expect that it would be a difficult matter to get through the coming winter with the present plant.

At Dunfermline, Mr. Blair, a town councillor, makes the complaint that when the Gas Committee were appointed, the understanding was that no business of vital importance would be done without consulting the whole Commission. The fixing of the price of gas was, he considered, a matter of importance; and he was much surprised when, on the balance-sheet being presented last year, they were told that the Committee had fixed the price of gas, and that the Commissioners had no right to interfere. If he were returned to the Council he would insist that the whole Commission should have a say in matters of importance.

At Hamilton, Bailie M'Hale, the Convener of the Gas Committee, made a few interesting comparisons. He said that in justice to the Gas Manager, and also to the Committee, he thought he might be allowed to give some contrasts of the present state of gas supply as compared with former times; and he believed these contrasts would be ample justification for the expenditure made at the works. The funded debt amounted to £36,250; and on the other side, there was the value of the gas-works as a commercial concern, which he put at £110,000 or £120,000. But taking it at £110,000, this left £73,000 in favour of the works. The contrast between the wages bill of 1892 and last year was only £170; and yet they were making almost double the quantity of gas. In other words, they were making as much more for an increase of £170. The results mentioned were in great measure due to the Manager (Mr. Ewing) and also to the staff under him. He went on to show that in 1892, the average wage of the workmen at the gas-works was 25s. 6d., and now, with much shorter hours, it averaged 30s. per week; so that the difference was not made at the expense of the men, but by improved methods.

The Sub-Committee of the Glasgow Corporation Gas Committee, on Monday, discussed at considerable length the subject of the site for the new gas-works. Their recommendation to the parent Committee is to adopt the site at Blochairn; but it is stated that there was considerable difference of opinion in regard to the recommendation. It may be taken for granted that those who object to a gas-works being planted in their neighbourhood will wield, with all the power they can, the argument that the site is not in itself suitable, on account of its elevation. Mr. Foulis will be able to deal with that argument to the satisfaction of everyone except those who may have an objection to being convinced. This is an excellent time for gauging public opinion on the subject; and I should say, judging from the tone of the remarks at meetings of electors, other than those in the East-end, the reception given to the proposal to build a gas-works there is not hostile. If, therefore, the Gas Committee adopt the site, it should be easily carried in the Council.

That acetylene gas is likely to take the place of coal gas in some places—chiefly small ones—may be expected. It has done so already in

one or two little towns in Scotland. In Portsoy, as has been already stated, an installation has been started. It appears that the gas-works were for about 10 years the property of Mr. Adam L. Gillan, a resident in the town, and that the Police Commissioners acquired the whole plant from Mr. Gillan for £200. The works were quite worn out, as is the case in many small towns. There was a favourable opportunity for making a change, if a change were to be thought of. The Commissioners resolved to give acetylene gas a trial. They have had erected a Kay's patent No. 8 generator, with eight retorts, each capable of holding 20 lbs. of carbide, a scrubber and washer, two purifiers, and a station meter. The gasholder is the one that was used for coal gas. In the town the whole of the mains and service-pipes have been renewed. The cost of these works is about £1500. This sum, with the £200 paid to Mr. Gillan, will make an exceedingly small capital for the supply of gas to a town with a population of slightly over 2000. So far the venture has been successful. If it continues to be so, the Police Commissioners will not be grudged the credit which will be their due; but it was a bold undertaking on the part of the Police Commission of so small a town to convert the whole of the gas supply at one stroke from one system of lighting to another. It would have been more prudent to have had an experiment for at least one season in a particular district.

The first of the thoroughfares in Edinburgh which the Gas Commissioners have agreed to light by means of the new Welsbach incandescent gas system, has been fitted with the burners. It is what is known as the Middle Meadow Walk. There are 27 lamps in it, two of which are clusters of three lights. With the lamps 25 yards apart, the illumination is an undoubted success, if other conditions should prove favourable. As to ability to stand the weather, no better test could have been brought to bear upon the system than on Monday and Tuesday last, when the mantles had been in use for a few nights. The storm of wind and rain which then beat upon the lanterns, in a very exposed situation, too, was sufficient to try them most thoroughly. When the storm was at its height, the illumination of the mantle was not so perfect as in still air; the top part being considerably duller. Next day it could be seen that the mantles had been somewhat knocked about, and were, in some instances, a little frayed. None of them, however, were broken, or required renewal. This result must be considered to be altogether satisfactory, when it is remembered that a gale of such severity and continuance has not been experienced during the past 25 years. Since the beginning of the week, the lamps on one side of the thoroughfare have had holophane globes fitted on to them, which improves the effect.

The Arbroath Gas Corporation met on Monday to consider the motion, notice of which was given by Mr. Strachan last week, to rescind a resolution to apply to Parliament for borrowing powers to the amount of £15,000. Mr. Strachan moved his motion, and in support of it used the very negative arguments that they did not require to borrow money in the meantime, and that he would like to know what it was wanted for. It was explained that the borrowing powers were exhausted; and that if they had authority to borrow a considerable sum, they would get money cheaper than if the amount they could borrow were small. They had, it was further explained, no particular object in view in seeking the borrowing powers. Mr. Strachan's motion was rejected by 11 votes to 20.

The Stirling gas controversy would appear to be almost interminable. The Town Council had another hot discussion upon it on Monday. This time it was the expenses of the opposition to the Gas Company's Bill which was the bone of contention. These have been taxed by the Auditor of the Court of Session, and reduced from £2662 to £2595—a difference of £67. A long discussion took place, of a not very friendly nature, at the end of which the Council agreed to remit to the Town Clerk to say from what fund the money is to be drawn to pay the accounts.

Provost Mitchell, of Montrose, is necessarily a Magistrate, and is, in the course of his duties, under the necessity of, at sundry times, applying his mind judicially to various questions. That he is not very specially gifted in that direction is demonstrated by his conduct in allowing himself to be sued by the Montrose Gas Company for £16 13s. for gas supplied to him between Feb. 1, 1896, and May, 1898. The action came before Sheriff Lee at Forfar on the 13th inst.; and the defence, which was simply that the quantity of gas charged for was not burned, was pressed to the extent of taking the evidence of Mr. T. Douglas Hall, the Manager at Montrose, of his meter inspector (Mr. A. Low), and of the Provost himself. The evidence disclosed that the dispute had reference only to the gas charged for in the quarter beginning in February, 1896. Since May of that year, there had been no cause for complaint. In that quarter, the quantity of gas consumed amounted to 51,200 cubic feet, as compared with 35,600 cubic feet in the corresponding quarter in 1895. When complaint was made, the meter was sent to Edinburgh to be tested, and it was there certified to be one-half per cent. slow, and was stamped as correct. The Sheriff said he did not think there was any doubt that the Provost had good grounds for complaint at the charges for gas which he had been called upon to meet, but he thought it must be the experience of every careful householder that such great discrepancies in gas accounts were quite common. One knew from experience that a large gas bill produced for the next quarter an amount of vigilance which resulted in a quite startling reduction of the account. He had little doubt here that, had the Provost made careful inquiries, he might have discovered where the waste was going on in his own house. He was displeased at the extent of the account, and, his Lordship had no doubt, showed his displeasure in his own house as well as to the Gas Company, with the result that there had been in subsequent periods the very large reduction referred to by the defence. The resisting of payment practically amounted to a counter-claim brought by the Provost against his own meter. On the part of the Company, the statutory regulations had been complied with; and decree must be given for the amount sued for, with expenses.

Proposed New Water-Works for Warrington.—The Corporation of Warrington have under consideration the question of providing additional storage accommodation for water for manufacturing purposes for the town; and with a view of increasing these facilities, they have called in to advise them Mr. James Mansergh, of Westminster. This gentleman has inspected the district, and has notified the Council that he is in favour of the provision of a new reservoir on the Cheshire side of the town, in close proximity to the old water-works. Further extensive works at Winwick are suggested. Powers will be sought next session to enable the Corporation to carry out the proposed works.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 22.

Sulphate of Ammonia.—The market on the east coast continues to be very quiet; and the quotation f.o.b. Hull and Leith remains at £9 10s. per ton. At Liverpool, there has been a fair demand; and, supplies being small, full prices have been paid in the case of urgent orders for immediate delivery. The closing quotation is £9 13s. 9d. to £9 15s. per ton. Consumers mostly maintain an attitude of indifference; and the buying has mainly been for covering purposes. The forward position is unchanged; London make, Beckton terms, being still quoted £9 10s. per ton, delivery last three months of the year.

Nitrate of Soda is steady at 7s. 7½d. per cwt. for good, up to 7s. 9d. per cwt. for refined quality, on spot.

LONDON, *Oct.* 22.

Tar Products.—There seems no bottom to the depths which benzol may go. A large business is reported in 90's benzol at 7¾d. f.o.b. As this price includes casks and some carriage on the benzol, the maker will probably not net more than 5½d. naked for the benzol at his works. If the cost of refining and chemicals are again taken off this figure, benzol appears to be of little more value than creosote oil. There is a steady market for creosote and carbolic acid, both of which are moving off freely for home as well as foreign consumption. Pitch is fairly firm, but that produced on the east coast at the moment enjoys some advantage over other positions in Great Britain, possibly on account of cheaper freights. Naphthalene is asked for. But the prices offered form no inducement to extract it from the oils; and the same remark applies to anthracene, which is as dull as it can be.

The following are the market quotations: Tar, 14s. to 19s. Pitch, east coast, 25s. 6d.; west coast, 22s. 6d. Benzol, 90's, 7¾d.; 50's, 8d. Toluol, 1s. 1d. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 0½d. Crude, 30 per cent., naphtha, 3¼d. Creosote, 2⅜d. Heavy oil, 40s. to 50s., according to gravity. Carbolic acid, 60's, 1s. 11d. Naphthalene, 50s.; salts, 30s. Anthracene, nominal "A," 4d.; "B," 3d.

Sulphate of Ammonia.—The market continues dull; and buyers are also shy, particularly in respect to forward purchases. Spot parcels for considerable quantities have been done at about £9 7s. 6d. per ton, less 3¼ per cent., which may be said to be the average price obtaining at all ports. The firmer position of nitrate of soda again puts sulphate out of parity as regards nitrogen value—a condition of things which ought not to be.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The position throughout the coal trade of this district remains much the same as reported last week. The better qualities still move off but moderately for house-fire requirements; and the output of the collieries working five days per week is generally ample to meet the demand, with the result that comparatively little or nothing is being filled up out of stock. Common round coals move off readily for steam and forge purposes; and prices for all descriptions of round coal on inland sale are firm at the full quotations. For shipment, there is not more than a slow inquiry, with a continued easing down in prices. At the pit, best Wigan Arley is quoted 11s. to 11s. 6d. per ton; Pemberton four-feet and seconds Arley, 9s. 6d. to 10s. 6d.; and common round coal, 7s. 6d. to 8s. 6d. For delivery at the ports on the Mersey, ordinary steam coal can be bought at from 9s. to 9s. 6d. per ton, or even a trifle less in some cases. Engine classes of fuel are rather more plentiful on the market; and rates are scarcely maintaining the strong, hardening tendency which has been noticeable recently. Sellers are, however, very firm at the full current prices, which average 3s. 6d. to 3s. 9d. per ton at the pit for common, 4s. 3d. to 4s. 6d. for medium, and 4s. 9d. to 5s. 3d. for best qualities.

Northern Coal Trade.—There has been considerable interference with the coal trade by the stormy weather, which delayed steamships, and thus caused some of the collieries to experience idle time, and occasionally to take lower prices. Arrivals of the delayed vessels are now giving greater activity, and stiffening prices. Best Northumbrian steam coals are steady at 9s. 9d. per ton f.o.b.; second qualities being 9s.; and steam smalls, 5s. 9d. Manufacturing coals are steady; consumption being well maintained, and prices unaltered. In the gas coal trade, the deliveries have been a little interfered with by the storm; but they are now very heavy, though to a great extent on old contracts, at prices that are much lower than the current quotations. For occasional cargoes of best Durham gas coals, up to 10s. 6d. per ton f.o.b. is asked; while contracts over next year are being arranged for at prices equivalent to 9s. 3d. per ton f.o.b. Prices of gas coke are unaltered.

Scotch Coal Trade.—The market has become steadier, which it was expected to do. Steam coal is in least request. Ell and splint are moving off quite freely. There is a good foreign demand. The prices quoted are: Main, 8s. per ton f.o.b. Glasgow; ell, 9s.; and splint, 9s. 3d. to 9s. 6d. The shipments for the week amounted to 205,178 tons—an increase of 8679 tons upon the previous week, and of 40,268 tons upon the corresponding week of last year. For the year to date, the total shipments have been 7,853,183 tons—an increase over the same period of last year of 1,463,775 tons.

Failure of the Electric Light at Wolverhampton.—The shopkeepers and residents of Wolverhampton who are supplied with electric light by the Corporation had an inconvenient experience on Saturday night of the treacherous character of this illuminant. The electric lighting station was opened three years ago by Lord Kelvin; and since then on three or four occasions mishaps have occurred which have plunged the centre of the town in semi-darkness. On Saturday night, about half-past seven, the whole of the street and private lamps went out; but just before eight o'clock the current was rectified for a few minutes, when darkness again reigned and the light did not reappear until ten minutes past nine o'clock. The incandescent lamps then shone again in the various buildings; but it was not until after half-past ten that the streets were illuminated by the arc lamps. Candles, paraffin, and other lamps had to be brought into use to enable people to transact their business.

Advance of Stokers' Wages in the London District.—Last Saturday, notices were posted at the various stations of The Gaslight and Coke Company announcing an advance in wages of 5d. per day to the stokers and scoop drivers, and of 4d. per day to the coke wheelers and coke-hole men.

Bursting of a Liverpool Water Pipe-Line.—On Sunday night of last week, the 44-inch pipe-line between Prescot and Liverpool burst at Horns Smithy, a hamlet within the Huyton-with-Roby district. The surrounding fields and highway were flooded to a depth of 2 to 3 feet, as well as a farmhouse and other buildings in the vicinity. The fracture in the main was about 4 feet long. A short time ago the same pipe-line burst at a point a mile nearer to Prescot.

Lighting of Menston by Gas.—By way of signalizing the commencement of lighting the streets of the village of Menston (Leeds) by gas, a ceremony took place on Saturday, the 15th inst., in which several members of the Parish Council, the School Board, the Wharfedale Rural District Council, and a large number of villagers took part. Mr. Jowett presented Mr. J. Crowther (Chairman of the Lighting Committee) with a silver-mounted lighting-stick, with which he lit the first lamp. Speeches were delivered by Mr. J. Clayton (Chairman of the Parish Council), Mr. Crowther, and others. A dance was afterwards held in the Board School. There are 80 lamps, the gas for which is supplied by the Yeadon and Guiseley Gas Company.

Objections to Penny-in-the-Slot Gas-Meters.—At the meeting of the Lighting and Electrical Committee of the Cardiff Corporation last Tuesday, it was reported that the Gas Company had declined to accede to the request contained in a petition to introduce penny-in-the-slot gas-meters; and it was decided to ask the Company to reconsider their decision. It appears that the Company have given several reasons against the proposal. First, there were many streets in Cardiff where they had laid down mains in which only two or three private consumers were supplied, because the service had not been connected by the builders of the houses. Then the reports they had received from other towns where the system had been tried were not of such a nature as to make them feel inclined to take it up in Cardiff. Again, although the meters were supposed to be perfect, they were subject to being tampered with. A further point was that the price of gas was now only 2s. 10d. per 1000 cubic feet, and with fortnightly collections for the pennies the cost might go up to 3s. so that it would be dearer in the end. Troubles had arisen in other places, and prosecutions for fraud had taken place, through washers and other discs being dropped into the meters instead of pence; and, taken altogether, the Company did not see their way to adopt the system.

The Recent Failure of the Gas Supply at Bournemouth.—In explanation of the failure of the gas supply at Bournemouth on Sunday, the 16th inst., as reported in the "JOURNAL" last week, the Town Clerk (Mr. J. Druitt, jun.) received a letter from the Gas Company's Secretary (Mr. W. Cash), in which he expressed the sincere regret of the Directors at the accident, and at the resulting general inconvenience, and said: "I may briefly explain that this unfortunate occurrence was caused by the blocking with water of the outlet of our principal gasholder, and by the subsequent failure of the pump used to withdraw the water. The failure of the pump was not evident until too late; air being withdrawn, and the impression created in the minds of the workmen that the outlet was clear. Such an occurrence is, from all I can learn, almost unique in gas-making experience." Mr. Cash hoped the Council would rest well assured that his Directors had taken steps that such an accident should not occur again. At the meeting of the Council last Wednesday, the Town Clerk stated that on the previous Monday afternoon he received a visit from Mr. Corbet Woodall, who had travelled from Ipswich, where he saw the account of the accident in the papers, and had come straight to Bournemouth to investigate the matter. He made his first call at the Borough Offices, where he expressed the great regret of the Company that such a thing had happened.

The Public Lighting Question at Halesowen.—A largely attended meeting of ratepayers of Halesowen, Hasbury, Hawne, and Hill was held on Monday last week for the purpose of considering the terms required by the Halesowen Gas Company for lighting the public lamps in the districts named. The Chairman of the Council (Mr. W. Green) said the question of lighting the public lamps in Halesowen and district had been a sore point for a number of years past. Three years ago the Company made a reduction of 5s. per lamp; but the Council were bound for a period of three years. In June last a deputation was appointed to meet the Directors of the Company; and, after discussion, the Directors said they would light the lamps at £3 per lamp for eight months, and £2 15s. if they did not light them when there was a full moon, which amounted to about five nights per month. The Company did not carry out their promise; and the Council decided to agree to the terms of £3 per lamp. But they refused to be bound by a three years' contract; and in consequence the town had been in darkness since Sept. 1. He did not think the Council would be justified in binding themselves to a three years' agreement in the face of an offer from an electric company to light the parishes from end to end at £2 10s. per lamp. In reply to questions, the Chairman stated that the Clerk had been instructed to apply to the Board of Trade for a Provisional Order to authorize the Council to supply electricity for lighting and other purposes in the district. The prices paid per lamp for public lighting in surrounding places were: Stourbridge, £2 10s. per lamp; Brierley Hill, £2 12s. 6d.; Cradley, £2 10s.; and Halesowen, £3 5s. Among other speakers at the meeting was Mr. C. E. Bloom (Chairman of the Gas Company), who remarked that, when the deputation from the Council waited upon them, nothing was said regarding the period of the agreement, or they could have quoted accordingly. Ultimately, a resolution approving of the Council's action in the matter was carried, with a number of dissentients. As we are going to press, we learn that the dispute has been settled by the Company accepting the terms of the Council—viz., the payment of £3 per lamp for a period of two years, as compared with three years under the old contract. It is hoped that by the end of the present week the Company will be able to have the whole of the lamps ready for lighting. The agreement has given much satisfaction to the inhabitants, who have lately been put to much inconvenience.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 912.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p. c.	21½—22¾*	..	4 13 4
100,000	10	,,	7½	Do. 7 p. c.	16—17⅝	..	4 8 3
300,000	100	July 1	5	Australian 5 p. c. Db. .	105—107	..	4 13 6
200,000	5	May 26	6	Bombay, Ltd. . . .	6½—7	..	4 5 9
40,000	5	,,	6	Do. New, £4 paid .	4½—5	..	4 16 0
380,000	Stk.	Aug. 12	12	Brentford Consolidated	275—280	..	4 5 9
240,000	,,	,,	9	Do. New	210—215	..	4 3 9
50,000	,,	,,	5	Do. 5 p. c. Prf.. .	140—145	..	3 9 0
159,375	,,	June 10	4	Do. 4 p. c. Db. Stk.	130—135	..	2 19 3
220,000	Stk.	Sept. 15	11½	Brighton & Hove, Orig..	263—268	..	4 5 10
226,320	,,	,,	8½	Do. A. Ord. Stk. .	190—195	..	4 7 2
933,500	Stk.	Aug. 31	5	Bristol, 5 p. c. max. . .	125—130	..	3 16 11
420,000	20	Sept. 29	10	British	50—52	..	3 16 11
50,000	10	Aug. 12	11½	Bromley, Ord. 10 p. c. .	25—27	..	4 5 2
75,000	10	,,	8½	Do. 7 p. c. .	20—22	..	3 17 3
500,000	10	Oct. 13	6	Buenos Ayres (New) Ltd	9—9⅛*	..	6 6 4
98,122	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	98—100	..	4 0 0
150,000	20	July 14	8¼	Cagliari, Ltd. . . .	29—30	..	5 10 0
100,000	10	Sept. 29	7	Cape Town & Dis., Ltd.	15—16	..	4 7 6
50,000	50	May 3	6	Do. 6 p. c. 1st Mort.	58—60	..	5 0 0
550,000	Stk.	Oct 13	13½	Commercial Old Stock .	310—320*	..	4 4 5
200,750	,,	,,	10½	Do. New do. . .	247—252*	..	4 3 4
200,750	,,	June 10	4½	Do. 4½ p. c. Db. do.	148—153	..	2 18 10
800,000	Stk.	June 10	12	Continental Union, Ltd.	207—212	..	5 13 2
200,000	,,	,,	9	Do. 7 p. c. Prf. .	193—198	..	4 10 11
51,600	Stk	Aug. 31	14	Croydon A 10 p. c. . .	305—310	..	4 10 4
168,400	,,	,,	11	Do. B 7 p. c. . .	255—265	..	4 3 0
555,000	Stk.	Aug. 12	5½	Crystal Palace Ord. 5 p. c.	125—130	..	4 0 9
60,000	,,	,,	5	Do. 5 p. c. Prf. .	140—145	..	3 9 0
486,090	10	July 28	11	European, Ltd. . . .	23—24	..	4 11 8
354,060	10	,,	11	Do. £7 10s. paid .	17—18	..	4 11 9
5,922,230	Stk.	Aug. 12	12½	Gaslight & Coke, A, Ord	288—293	−2	4 3 6
100,000	,,	,,	4	Do. B, 4 p. c. max. .	120—125	..	3 4 0
665,000	,,	,,	10	Do. C, D, E, 10 p. c. Prf.	308—313	..	3 3 11
30,000	,,	,,	5	Do. F, 5 p. c. Prf. .	152—157	..	3 3 8
60,000	,,	,,	7½	Do. G, 7½ p. c. do. .	230—240	..	3 2 6
1,300,000	,,	,,	7	Do. H, 7 p. c. max. .	195—200½	..	3 10 0
463,000	,,	,,	10	Do. J, 10 p. c. Prf. .	308—313	..	3 3 11
476,000	,,	,,	6	Do. K, 6 p. c. Prf. .	185—190	..	3 3 2
1,061,150	,,	June 10	4	Do. 4 p. c. Db. Stk. .	131—133	..	3 0 2
294,850	,,	,,	4½	Do. 4½ p. c. do. .	148—153	..	2 18 10
958,000	,,	,,	6	Do. 6 p. c. do. .	198—203	..	2 19 1
70,000	10	May 12	8	Hongkong & China, Ltd.	14—15	..	5 6 8
3,800,000	Stk.	,,	10	Imperial Continental .	223—228	−5	4 7 9
376,400	100	Aug. 2	4	Do. 4 p. c. Dbs. Red.	98—101	..	3 19 3
473,600	Stk.	Aug. 12	3½	Do. 3½ p. c. Db. Stk. ,,	101—104	..	3 7 4
560,000	100	Oct. 1	5	Met. of Mel- 5 p. c. Db.	110—112	..	4 9 3
250,000	100	,,	4½	bourne 4½ p. c. Db.	105—107	..	4 4 1
					* Ex div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
75,000	5	June 29	6	Malta & Medn., Ltd. .	4⅞—5½	..	5 14 3
541,920	20	June 10	5	Monte Video, Ltd. . .	13½—14½	..	6 18 0
617,946	Stk.	Aug. 31	9¾	Newc'tle & Gatesh'd Con.	230—240	..	4 1 3
252,355	Stk.	Jan. 3	3½	Do. 3½ p. c. Db. Stk.	113—117	..	2 19 10
150,000	5	May 26	8	Oriental, Ltd. . . .	7⅞—8	..	5 0 0
135,000	5	,,	8	Do. New, £4 10s. pd.	6⅞—7	..	5 2 11
15,000	5	,,	8	Do. do. 1879, £1 pd.	1⅞—2	..	4 11 5
60,000	5	Sept. 29	7	Ottoman, Ltd. . . .	5—5½	..	6 6 2
500,000	100	June 1	6	People's Gas } 2nd M. of Chicago } Bd. .	103—108	..	5 11 1
848,070	10	Oct. 13	6	River Plate Ord.. . .	9—9⅜*	..	6 6 4
250,000	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	99—101	..	3 19 3
250,000	10	Sept. 29	10	San Paulo, Ltd. . . .	14½—15½	..	6 9 0
135,000	Stk.	Sept. 15	10	Sheffield A.	242—245	..	4 1 8
209,053	,,	,,	10	Do. B.	242—245	..	4 1 8
447,427	,,	,,	10	Do. C.	242—245	..	4 1 8
5,600,000	Stk.	Aug. 12	5⅓	South Metrop., 4 p.c. Ord.	140—143	..	3 14 7
1,460,000	,,	July 14	3	Do. 3 p. c. Db. Stk. .	102—105	..	2 17 2
60,000	Stk.	Aug. 31	12	Tottenham and } A. .	280—290	..	4 2 9
60,000	,,	,,	9	Edmonton } B. .	200—210	..	4 5 9
182,380	10	June 10	7	Tuscan, Ltd.	10½—11½	..	6 1 9
149,900	10	July 1	5	Do. 5 p. c. Dbs. Red. .	100—103	..	4 17 1
				WATER COMPANIES.			
746,164	Stk.	June 29	10½	Chelsea, Ord.	313—318	..	3 6 0
150,000	,,	,,	5	Do. 5 p. c. Prf. . . .	170—175	..	2 17 2
160,000	,,	,,	4½	Do. 4½ p. c. Pf. Stk., 1875	148—152	..	2 19 3
175,785	,,	Sept. 29	4½	Do. 4½ p. c. Db. Stk. .	155—160	..	2 16 3
1,720,560	Stk.	Oct. 13	7	East London, Ord. . .	212—217*	..	3 4 6
654,740	,,	June 29	4½	Do. 4½ p. c. Db. Stk.	157—160	..	2 16 3
390,000	,,	,,	3	Do. 3 p. c. Db. Stk..	103—105	..	2 17 2
700,000	50	June 29	7½	G'd Junct'n, 10 p. c. max.	115—118	..	3 3 7
310,000	Stk.	Sept. 29	4	Do. 4 p. c. Db. Stk.	140—145	..	2 15 2
708,000	Stk.	Aug. 12	14	Kent	365—370	..	3 15 8
160,000	,,	,,	7	Do. New, 7 p. c. max..	212—217	..	3 4 6
1,043,800	100	June 29	10	Lambeth, 10 p. c. max..	300—305	..	3 5 7
406,200	100	,,	7½	Do. 7½ p. c. max..	227—232	..	3 4 8
350,000	Stk.	Sept. 29	4	Do. 4 p. c. Db. Stk.	140—145	..	2 15 2
500,000	100	Aug. 12	13½	New River, New Shares	435—440	..	3 0 2
1,000,000	Stk.	July 28	4	Do. 4 p. c. Db. Stk.	140—145	..	2 15 2
902,300	Stk.	June 29	6	Southw'k & V'xhall, Ord.	166—171	..	3 10 2
126,500	100	,,	6	Do. do. 7½ p. c. max..	160—165	..	3 12 9
489,200	Stk.	,,	5	Do. do. 5 p. c. Prf. .	170—173	..	2 17 10
1,019,585	,,	Oct. 13	4	Do. 4 p. c. A Db. Stk.	139—142*	..	2 16 4
1,155,066	Stk.	June 10	10	West Middlesex . . .	300—305	..	3 5 7
200,000	,,	,,	4½	Do. 4½ p. c. Db. Stk.	162—165	..	2 14 7
200,000	,,	Sept. 15	8	Do. 8 p. c. Db. Stk.	102—105	..	2 17 2
					* Ex div.		

St. Helens and the Water Supply at Rainford.—In response to an application by the Rainford District Council, the Local Government Board have sanctioned the borrowing of £6000 for constructing the works necessary for obtaining a supply of water for the town from the pumping-station of the St. Helens Corporation at Eccleston Hill.

Colonial Gas Association, Limited.—The annual accounts of this Company show a profit of £3473, including the dividend on the shares held in the Charters Towers Gas Company, Limited. From the amount named, £756 was paid to the shareholders as an interim dividend; and after providing for interest on debentures, &c., to June 30, there remains a balance, including the amount brought forward, of £2099. The Directors now recommend a dividend, for the second half of the year ending the 30th of June last, at the rate of 3½ per cent. per annum, free of income-tax.

Ceara Gas Company, Limited.—The report of the Directors of this Company for the year ended June 30 last discloses a satisfactory increase in revenue; the consumption of gas being nearly 10 per cent. more than in 1897. But the charges in Ceará have again been largely augmented, mainly in consequence of the continued fall in exchange, and the action of the State Government in exacting additional taxes and duties on imports. Notwithstanding these additional charges, and the higher price of coal and freight, the result of the working is a net profit of £3589, which, added to the balance brought forward, gives a total of £3676. Deducting the interim dividend paid in April last (£1611), there remains £2065 available for division. The Directors recommend the payment of a dividend for the six months ended June 30 of 5 per cent. on the preference shares (less income-tax) and of 4 per cent. on the ordinary shares; making together £1911. These payments, with the interim dividend, will make for the year 10 per cent. on the preference shares and 7 per cent. on the ordinary shares.

The Camborne Water Company and the Outbreak of Typhoid Fever.—It was recently reported to the Camborne District Council that the Water Company had agreed to pay £75 as a donation towards the expenses incurred owing to the outbreak of typhoid fever in the district last year. At the meeting of the Redruth Board of Guardians, a member called attention to this, and asked if a return could be prepared showing the cost the Guardians were put to in connection with the outbreak. If they were liable to the District Council, were they not also liable to the Guardians? Mr. W. Rabling said the Company did not admit liability. The Clerk said the question of the liability of the Company had already been asked; and he had taken Counsel's opinion upon it. Counsel advised that, as the law stood, they could not get a verdict of the Courts in their favour until they went to the House of Lords. There was a judgment of a Court below which Counsel thought might possibly be upset in the Upper House. Were they prepared to go to the House of Lords? As to the costs incurred, they could only get an approximate return from the relieving officers; and he was afraid it would be misleading. The Board took no action in the matter. In future, the Medical Officer of the Camborne Council is to inspect the sources of water supply once every two months, and report the result.

New Mills Water Supply.—A well-attended meeting of New Mills ratepayers last Tuesday evening authorized the District Council to promote a Bill in Parliament to enable them to purchase the existing waterworks, which are quite inadequate, and construct other works. The cost is roughly estimated at £40,000.

The Filey Water and Gas Works Purchase.—Under the scheme for the distribution of the £55,000 paid by the Filey Urban District Council for the gas and water undertakings, every old £5 share is represented to be worth £15 10s.; the £10 shares, fully paid up, are estimated to be worth £21 14s., and the £10 shares (£6 paid), £13 0s. 5d. each. The sum of £500 is to be divided between the Vice-Chairman (Mr. Pirie), the Managing Director (Mr. Tobey), the Secretary (Mr. Rowe), and Mr. W. Dowsland.

The Norwich Corporation and the Water-Works.—At a special meeting of the Norwich Town Council, held at the Guildhall, last Tuesday, a report of the Law and Parliamentary Committee was presented, dealing with the negotiations between the Council and the Water Company as to the acquisition of their works by the Corporation. The Committee were willing to recommend the Council to give each share and debenture holder for his interest in the Company such a sum of Norwich Corporation 3 per cent. stock at par as would produce the same amount of income as that now received by the holder from the Company—an income which would not be subjected to the possibility of reduction from such accidents and causes as all water companies are liable to. The Secretary of the Company wrote to say that the Directors were unanimously of opinion that the proposal of the Corporation did not offer such an inducement to the shareholders to part with their property as would justify the shareholders being called together for considering the matter. The Committee recommended that further action be delayed until next year. The report was adopted.

A Relic of the Old Uxbridge Water-Works.—According to the "History of Uxbridge," water-works were constructed in the town by Mr. J. Yarnold in 1701, subsequently converted into copper-mills, and since used as plate-glass mills. "The river water was conveyed to the houses at reasonable rates, by means of large wooden pipes. Mr. Yarnold had a lease from the Lords of the Manor and Borough of such parts of the waste land as were necessary to lay the pipes, for 99 years, at the annual rent of 40s. and a couple of fat capons. The inhabitants, upon paying a rate of £1 per annum for each house, were allowed to insert leaden pipes into those of wood. The water was laid on to the top of the town in the morning and to the bottom in the afternoon of one day, and the reverse the next day. The supplies of water from the water-works ceased in 1799 or 1800." An item of interest to record in connection with these works is, that during some excavations recently the workmen engaged by the Uxbridge Urban District Council have come across two of the old, and indeed now antiquated, pipes, one of which had to be taken out of the direction in which the men were working, while the other was left. The wooden pipe, which looked like a trunk of a tree, was in excellent condition, and the holes where the leaden pipes were allowed to be inserted were clearly discernible.

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Loughborough Corporation and the Gas-Works.—The Loughborough Corporation on Monday last week decided to promote a Bill in the ensuing session of Parliament to authorize them to purchase, by agreement or compulsorily, the property of the local Gas Company, and to generate and supply electricity for public and private purposes.

The Godalming Town Council and the Water-Works.—A special meeting of the Godalming Town Council was held last Thursday, for the purpose of considering a report from the Water Committee as to what steps should be taken to effect the purchase of the undertaking of the Godalming Water Company. The Committee advised the Council to promote a Bill next session, containing provision for the compulsory purchase of the undertaking. This the Council agreed to, with a few dissentients.

Injury to Fish by Gas Lime.—At their meeting last week, the Devon Sea Fisheries Committee received a report from the Committee appointed to consider the complaint that injury was caused to the fish in Torbay by the deposit of spent lime on the foreshore near the Torquay Gas Company's works (*ante*, p. 205). The Committee were of opinion that the lime which is deposited below high-water mark and washed away by the tide does have an injurious effect; and it was decided to request the Company to discontinue the practice.

Curious Gas Explosion at the Victoria Station, Sheffield.—An alarming accident took place at the Victoria Station, the depôt of the Great Central Railway Company in Sheffield, last Wednesday night. Shortly before the arrival of the 7.38 Manchester express, a number of carriages were being shunted across the down main line, when, owing to a mistake in the points, a heavy composite carriage was thrown off the rails, fouling the main line. The heavy wheels ploughed up the permanent way, and cut up the gas-supply main used for filling the reservoirs of the trains. An explosion immediately occurred; the flames shooting up between the carriages to a considerable height. Amid a scene of great excitement, the station fire-hose was connected and turned on, and an endeavour made to extinguish the flames by heaping ballast on them. It was not, however, until the inspector in charge of the gas appliances was called, and turned off the supply, that the fire was got under.

Entertainment to Workpeople.—The first evening meeting of the present season of the workpeople of Messrs. W. J. Jenkins and Co., Limited, of Retford, was held last Saturday week, in the large new reading-room at the Beehive Works, when 180 of the employees, with their wives, partook of a substantial tea, after which the opening concert was held. This was listened to by upwards of 250 members and friends and proved most enjoyable, the music being admirably rendered. In a short opening address, Mr. W. J. Jenkins explained the objects of the meeting, and gave particulars of the aims of the Committee. The Company appreciate the advantages of technical education for their apprentices, and are seeking to make its acquisition as agreeable as possible by providing the room and the lecturers, and by enrolling the employees in an association in which the older men may take interest at least in the Saturday evening lectures and concerts, which it has been arranged to give fortnightly.

A Proposed Welsh Water Scheme for Wallasey.—A special private meeting of the Wallasey District Council was held yesterday week to consider a new scheme for a water supply from Flintshire. Mr. G. F. Deacon, the Engineer appointed to prepare plans of the scheme, estimated the probable cost at about £465,000. Most of the members seemed to think further consideration of the project was necessary; and it was referred back for this purpose.

The Position of Welsbach Shares.—According to the "Pall Mall Gazette," "Welsbachs would appear to be worth some attention just now. The market in them has been rather dull for some time past, owing in considerable degree to the inability of the Company to keep pace with the demand for its mantles. This difficulty has now been obviated by an arrangement with three or four outside firms to manufacture the mantles; and it is stated that the Company is in a position to satisfy all demands that may be made upon it. In addition to this, its holding in the Austrian Welsbach undertaking is said to produce a good amount in dividends."

Serious Gas Explosion at Sydenham.—A disastrous explosion of gas occurred last Thursday morning at a private house, No. 10, St. Mark's Road, Lower Sydenham, resulting in the complete wrecking of the premises, and serious injury to three persons. It appears the house was occupied by a Mr. George Hill, with his wife and a daughter, aged ten years. About midday on Thursday, a loud explosion was heard, followed by screams; and the passers-by saw the roof of the house blown off, while the front of the premises fell into the road. On the house being entered, Mr. Hill, his wife, and daughter were found on the landing outside the first floor front room in flames. Assistance was at once rendered, and the fire was extinguished. In the meantime, a medical man was sent for. It appears that Mr. Hill perceived a smell of gas in the first floor front room, and, as the gas-fitters had been in the house, he thought there would be no danger in taking a candle-light into the room. When he opened the door the explosion occurred.

Incandescent Gas Lighting at Hornsey.—Mr. E. J. Lovegrove, the Engineer to the Hornsey District Council, has just reported upon the working of the incandescent lamps which have been in use in the district now for 290 days. There are 35 of this class of lamps within the area which is lighted by the Hornsey Gas Company, and 76 in the portion of the district within that of The Gaslight and Coke Company. The life of the mantles varied from 187 to 284 days. Where there was heavy traffic, the life was shorter than where it was light. The best results were obtained with the glass-rod chimneys. The cost of maintenance per annum works out at 7s. 3d. per lamp. The 3½-feet incandescent burners show the saving in the Hornsey Company's area to be 9s. 9d. per lamp per annum, and in that of The Gaslight and Coke Company 6s. 2d. If all the lamps in the parish were treated in the same way, the saving, after deducting the cost of maintenance, would be £104 a year. The lighting by flash has cost 15s. a week for extra work; but the new burner is said to obviate this, and to save 3s. 7d. per lamp per annum in the gas consumed by the flash-light. Some of the new burners are being tried in Southwood Lane, Highgate and require no chimney.

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SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY WORKS, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
ROCHESTER	500,000 Cubic Feet.

	Cubic Feet Daily.
TORONTO (Second Contract; Remodelled)	2,000,000
MONTREAL	500,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000
YORK	750,000

The Directors of Meters, Limited, announce a dividend for the current year on the preference shares at the rate of 5½ per cent. per annum, and on the ordinary shares at the rate of 5 per cent. per annum.

Messrs. Small and Co., of Belfast, have secured the contract for the construction of new filter-beds at the Killineer reservoir of the Drogheda Water-Works. The tender, with the pipe connections, amounts to £2490.

Messrs. W. J. Jenkins and Co., Limited, of Retford, have received orders from the Corporation of East Retford to supply a new retort-stack complete, with arches and chimneys and all necessary ironwork, for six settings of sevens. They are to have shallow regenerators of the latest type.

Messrs. Richmond and Co., Limited, recently held an exhibition of gas-stoves in the Corn Exchange, Cambridge, under the auspices of the Cambridge Gas Company. Miss Richmond gave lectures on cookery. The Gas Company will lay pipes up to 30 feet, and supply a penny-in-the-slot meter and cooking-stove, free of charge.

We are informed that Frank Wright's Prepayment Gas-Meter Corporation, Limited, have procured the services of Mr. J. H. Roby, late of the Welsbach Incandescent Gas-Light Company, Limited, whose chief representative he has been for some years in the North of England; and on the 26th inst. he will commence travelling on behalf of the Corporation.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

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[For Illustrated Advertisement, see Oct. 4, p. 780.]

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Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

WANTED, Carbon in 4 Ton Lots, or more; also OIL CARBON.
State Price, f.o.r. at nearest Station, to No. 3031, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER desires re-engagement as METER READER, or as Prepayment Collector, Storekeeper, Timekeeper, Salesman, or any suitable capacity. Nearly four Years in present Situation. Good Testimonials.
F. WILLIAM, 57, Edridge Road, CROYDON.

SITUATION wanted by a Practical Man as MANAGER or FOREMAN of Gas-Works. Thoroughly conversant with every detail in the Manufacture and Distribution of Gas, Generator and Regenerator Furnaces, Mains, Services, and Meters. Disengaged Oct. 28. Good References. Married.
Address MANAGER, Gas-Works, Somerton, SOMERSET.

GWYNNE & BEALE'S
PATENT
GAS-EXHAUSTERS AND STEAM-ENGINES
FOR FULL PARTICULARS, APPLY TO THE MAKERS:
GWYNNE & CO.,
Telegrams: "GWYNNEGRAM, LONDON."
HYDRAULIC AND GAS ENGINEERS
(Late Essex Street Works, Victoria Embankment, London),
Telephone No. 95 Holborn.
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

APPOINTMENT wanted by a Young Man as ASSISTANT to Gas Engineer. Three Years' Experience in a Modern Gas-Works (make 200 millions). Ordinary Silver Medallist and Honours Silver Medallist in Gas Manufacture, City and Guilds of London Institute. First-class References and Testimonials.
Address No. 3151, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Stoker. Regular Employment. Wages 25s. per week.
Apply to the MANAGER, Gas-Works, BISHOP'S STORTFORD.

STOKER wanted in small Works (Day and Night Shift). Wages 18s., with Cottage on the Works, and Coal and Gas.
Apply, by letter, to No. 3148, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ROTHERHAM CORPORATION GAS DEPARTMENT.

WANTED, Stokers for above Works.
Regular employment to suitable Men.
Apply to F. A. WINSTANLEY, Engineer and Manager.

WANTED, a young Man as Chemist at Tar and Vitriol Works (North of England). Must be willing to fill up time at Book-keeping.
Reply, stating Qualifications, Experience, Age, Salary required, and when at liberty, to No. 3149, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

MAIN and Service Layer wanted. Permanent Job to a really good Workman, who is willing to make himself generally useful on the Works.
Apply, by letter, stating Age, whether Married or Single, and Wages required, and enclosing *copies only* of Testimonials, to No. 3146, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Gas Company on the South Coast, an additional METER INSPECTOR and COLLECTOR. Must be of good address, and accustomed to both Ordinary and Prepayment Meters.
Apply, by letter, stating Salary desired, and enclosing *copies* of Testimonials, to No. 3150, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

REPRESENTATIVE WANTED.

FIRST-CLASS Glass Manufacturers in Germany (Silesia) require for London an energetic REPRESENTATIVE, well acquainted with the branch, for the Sale of their Gas Glow Light and Electric Lighting Articles of all kinds.
Please address B. C. 3776, care of Rudolf Mosse, BRESLAU.

FITTERS, MAIN AND SERVICE LAYERS.

WANTED, a strong, steady, and respectable Man as FITTER, MAIN and SERVICE LAYER, and METER FIXER. Must be a really good Workman, and one who would make himself generally useful on the Works. Permanent Situation and good Wages given to a reliable Man. None but those who have had a similar Experience need apply.
Apply, with References, stating Age, whether Married or Single, and previous Experience, to HUBERT RUSSELL, Secretary and Manager, Gaslight Company, Holmfirth, YORKS.

FOR SALE—Two Gasholders: One 21 ft. diameter by 10 ft. deep, with 4-inch Inlet and 3 inch Outlet Valves; and the other, 21 ft. diameter by 12 ft. deep, with 4-inch Inlet and 3-inch Outlet Valves.
Offers to THOMAS BOND WORTH AND SONS, LIMITED, Severn Valley Mills, STOURPORT.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

RETORTS AND FIRE-BRICKS.

THE Directors of the Rochester, Chatham, and Strood Gaslight Company are prepared to receive TENDERS for the supply of WORTLEY or STOURBRIDGE FIRE-CLAY RETORTS, FIRE BRICKS and CLAY.
Specification and Form of Tender may be obtained from the undersigned, to whom Tenders, endorsed "Retorts, &c.," must be delivered on or before Noon of Monday, Oct. 31, 1898.

J. M. VERVERS,
Engineer and Secretary.

Gas Offices, Rochester,
Oct. 20, 1898.

FIRE-CLAY GOODS.

THE Directors of the Sheffield United Gaslight Company invite TENDERS for the supply of FIRE-CLAY and GANNISTER GOODS (Retorts, Bricks, &c.), required for Renewals and Repairs at their Neepsend and Effingham Street Stations during the next Twelve Months.
Specifications and Forms of Tender may be had on application to the Company's Engineer, Mr. Fletcher W. Stevenson.
The Directors do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, marked "Tender for Fire-Clay Goods," addressed to the undersigned, must be delivered by post not later than the first post on Thursday, the 3rd of November.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
Oct. 7, 1898.

MANCHESTER CORPORATION GAS-WORKS.

ARTIFICIAL OXIDE OF IRON.

THE Gas Committee are prepared to receive TENDERS for the supply and delivery of about 2000 Tons of ARTIFICIAL OXIDE at their Gaythorn, Rochdale Road, and Bradford Road Works during the ensuing Twelve Months (Moisture not to exceed 35 per cent.).
Sealed Tenders, endorsed "Tender for Oxide," and addressed to the Chairman of the Gas Committee, to be delivered not later than Thursday, the 27th of October, 1898.

By order,
WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
Oct. 17, 1898.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.
He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.
Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
BRENTFORD GAS COMPANY.

£15,000 OF NEW STOCK 1881.

Ranking for a Standard Dividend of 7 per cent. per annum, subject to the Sliding-Scale; the last Dividend on similar Stock having been at the rate of 9 per cent.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Wednesday, Nov. 23, at Two o'clock precisely, in Lots.
Particulars may be obtained of the SECRETARY of the Company, at the Offices, BRENTFORD; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
LOWESTOFT WATER AND GAS COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday Nov. 8, at Two o'clock, in Lots,

1000 ADDITIONAL ORDINARY £10 SHARES

in the above Company, ranking for a Maximum Dividend of 7 per cent.; the last Dividend on similar Shares having been at the rate of 5¼ per cent.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
ALDERSHOT GAS AND WATER COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 8, at Two o'clock, in Lots.

150 £10 ORDINARY SHARES,

Ranking for a Maximum Dividend of 7 per cent.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Executors of the late J. Boorer, Esq., and other Owners.
SALE OF GAS STOCKS AND SHARES.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 8, at Two o'clock, in Lots,

STOCKS AND SHARES
IN THE
CROYDON COMMERCIAL GAS COMPANY,
BRENTFORD GAS COMPANY,
GRAYS GAS COMPANY, LIMITED, and
WANDSWORTH AND PUTNEY GAS COMPANY.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Trustees.
IMPORTANT SALE OF NEW SHARES IN THE
NEW RIVER COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Tuesday, Nov. 15, 1898, at Two o'clock precisely, in Lots,

62 £100 NEW SHARES (FULLY PAID) IN THE NEW RIVER COMPANY.

Ranking for Dividend equally with the "Adventurers'" and "King's" Shares.
The Dividends, which have for many Years past been paid at gradually increasing rates, were for the Half Year ending on the 30th of June last distributed at the rate of 13½ per cent. per annum.
Particulars may be obtained at the AUCTION MART; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

GAS STOCKS AND SHARES
IN THE
LEA BRIDGE DISTRICT GAS COMPANY,
TOTTENHAM AND EDMONTON GAS COMPANY,
ROMFORD GAS COMPANY, LIMITED, &
ENFIELD GAS COMPANY.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 15, at Two o'clock, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

TENDERS FOR GAS-MAINS.

THE Directors of the Isle of Thanet Gas Company, Margate, are prepared to receive TENDERS for the supply of the following MAINS:—
580 Yards 18-inch, in 12-feet Lengths.
1100 Yards 6-inch, in 9-feet Lengths.
300 Yards 4-inch, in 9-feet Lengths.
Further Particulars as to SPECIAL CASTINGS required, Date of Delivery, &c., may be obtained on application to the Manager, Mr. James Dougall.
Tenders, endorsed "Mains," to be sent in on or before Thursday, Nov. 3, addressed to the Chairman of the Company.
The Directors do not bind themselves to accept the lowest or any Tender.

By order,
THOS. C. FULLER,
Secretary.

Gas Company's Offices,
The Dane, Margate,
Oct. 21, 1898.

CEARÁ GAS COMPANY, LIMITED.

NOTICE is Hereby Given, that the ORDINARY ANNUAL GENERAL MEETING of the Shareholders will be held at the Offices of the Company, 9, Queen Street Place, Cannon Street, in the City of London, on Friday, the 28th day of October, at One o'clock in the Afternoon, to receive the Report of the Directors, to declare a Dividend, and for General Purposes.

By order of the Board,
THOMAS GUYATT,
Secretary.

Sept. 30, 1898.

THE Acetylene Illuminating Company, Limited, 63, Queen Victoria Street, London, E.C., GIVE NOTICE that they hold the BRITISH PATENT RIGHTS for the MANUFACTURE OF CALCIUM CARBIDE by means of the electric furnace, that they are bringing an action against the Midland Acetylene (Parent) Syndicate, Limited, to restrain them from so manufacturing that product, and that they intend in the future to bring actions against all infringers of these Patents and all purchasers or users of Carbide of Calcium made in infringement of the same.

ENRICH YOUR GAS
WITH
CHEAP BENZOL.

AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

Apply to SADLER & CO., MIDDLESBROUGH.

GAS PURIFICATION BY
HYDRATED OXIDE.

THIS Material is of full Strength, and Exceptional Activity. It is specially prepared to minimise Back-Pressure; and will be supplied on Hire, or Sold, on the most favourable Terms.

SPENT OXIDES containing Blue, also CRUDE FERRO-CYANIDE PRODUCTS, either PURCHASED or EXCHANGED for FRESH OXIDE.

MANCHESTER OXIDE COMPANY, LTD.,
CANAL ST., MILES PLATTING, MANCHESTER.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

Now Ready, Crown 4to., Price 3s. 6d.

GASHOLDER AND TANK

(Of One Million Cubic Feet Capacity)

AT THE

SUTTON GAS-WORKS.

Designed and carried out by

F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E.,

MEMBER OF THE INSTITUTION OF GAS ENGINEERS,
MEMBER OF THE SOCIETY OF ARTS,
CONSULTING ENGINEER.

EMBRACING NOTES ON GASHOLDER CONSTRUCTION GENERALLY.

REPRINT OF A SERIES OF ARTICLES IN THE "JOURNAL OF GAS LIGHTING," &C., WITH THE ACCOMPANYING PLATES.

Other Works by the same Author.

The Guide-Framing of Gasholders, and Strains on other Structures in Gas-Works	6s. 0d.
Gasholders With or Without Guide-Framing: A Discussion; and Literature on Gasholder Construction	1s. 0d.
Flow of Gas, and Proportioning Gas-Mains	7s. 6d.

PUBLISHED BY
WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·4 candles.
Coke	68 per cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.

8 Lombard Street,
NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per ton . .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to

W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON NEWCASTLE."

HOLMSIDE GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR

PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

NOW READY.

Foolscap 4to, pp. 535, with 239 Illustrations and Steel Plate Engraving (as Frontispiece) of WILLIAM MURDOCH, *Inventor of Gas Lighting.*
Morocco Gilt, 21s.; Roan Gilt, 18s.

THE SIXTH (AND CENTENARY) EDITION OF THE

HANDBOOK FOR GAS ENGINEERS AND MANAGERS.

BY

THOMAS NEWBIGGING,
M.Inst.C.E.

This Edition of the "Handbook for Gas Engineers and Managers" is a great improvement on all previous editions. Much of the text has been re-written, in order to keep the work abreast of the constant advances that are being made in the Gas Industry. About fifty additional Illustrations are given; and a Steel-Plate Engraving of William Murdoch, the Inventor of Gas Lighting.

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GAS ENGINEERS' AGENTS AND CONTRACTORS FOR
Meters, Fire-Clay Goods, Oxide of Iron, and all other Gas Apparatus. Retort Carbon purchased.
Inquiries Solicited.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

JAMES OAKES & CO.

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day. Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

Lanemark Coal Co., LIMITED.

LANEMARK CANNEL AND GAS COALS.

Quotations and Analysis on Application to

LANEMARK COLLIERY,

NEW CUMNOCK, N.B.

Shipping Ports: All the principal Scotch Ports.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY
FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.

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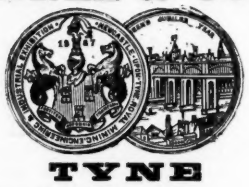
Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887,

for

CANNEL & COAL.



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BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
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TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
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Shipments Promptly and Carefully Executed.

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INCANDESCENT GAS LIGHTING

Has now gained a complete and final Victory over its last and greatest Enemy
VIBRATION,
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Incandescent Burner Fittings
Of which full Particulars may be had from
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Telegrams: "CLAYS, BOLTON."
See "Journal of Gas Lighting," July 7, 1896, p. 19, and Dec. 21, 1897, p. 1365.

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ALL KINDS
WRITE FOR PRICES
STAFFORDSHIRE TUBE Co., BIRMINGHAM.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
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NEWBATTLE COLLIERIES,
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HEATHCOTE GAS COAL.
Rich in Illuminating Power and Yield of Gas. Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.
THE GRASSMOOR CO., Ld.
CHESTERFIELD.

WELDON MUD
FOR
GAS PURIFICATION,
For use in the
RECOVERY OF SULPHUR,
ALSO
Removal of last Traces of SULPHURETTED HYDROGEN in catch position.
Full Particulars on application to the Patentees:
GAS DESULPHURIZATION CO.,
— LIMITED, —
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THORNLEY GAS COALS
WORKED BY THE
WEARDALE IRON & COAL Co., Ld.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.
Analysis made by
Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 „
Ash	2·73 „

For Price, &c., apply to the
WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.

COAL.
THE BIRCHENWOOD COLLIERY COMPANY, Ld.
KIDSGROVE, STOKE-ON-TRENT.

Produce very HIGH-CLASS COAL, and can supply on PROMPT and FAVOURABLE TERMS

WALLSEND COAL.
HARECASTLE—
SEVEN-FEET BAMBURY.
EIGHT-FEET BAMBURY.
BEST BIRCHENWOOD.
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LARGE WASHED NUTS.
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HUTCHINSON BROTHERS,
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MANUFACTURERS OF
Improved Wet & Dry Gas-Meters.
STATION-METERS. LAMP-METERS.
Test Gasholders and General Gas Apparatus.
Brass Main & Lamp Taps. Unions, Ferrules, &c.
The "Falcon" Lamplighter's Torch. Service Cleansers.
SYPHON AND OTHER PUMPS.
WOOD AND WROUGHT-IRON PURIFIER-GRIDS. SCRUBBER BOARDS.
WET AND DRY METERS REPAIRED.
FALCON WORKS, BARNSLEY.
Telegrams: "HUTCHINSON BROS., BARNSLEY."

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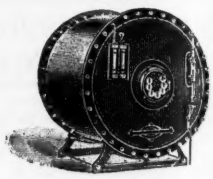
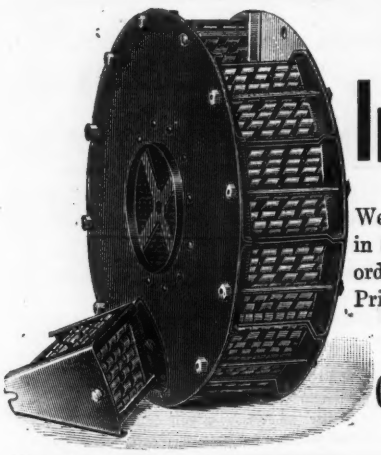
GAS ENGINEERS,

MILTON HOUSE WORKS, EDINBURGH.

LONDON. —— LEEDS. —— GLASGOW.





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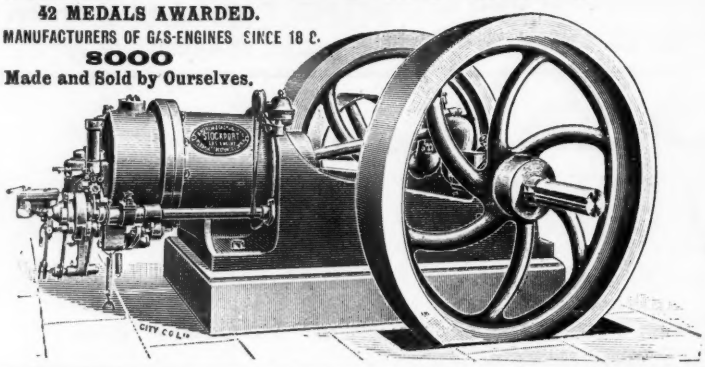

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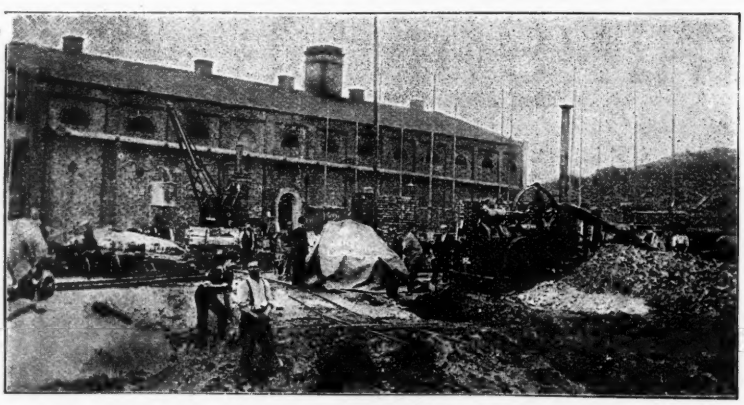

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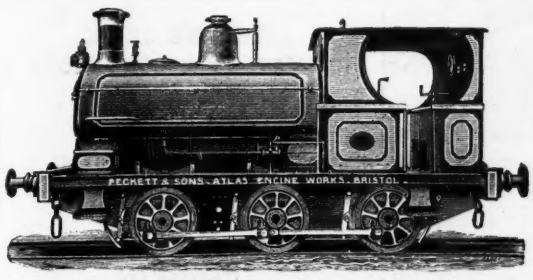

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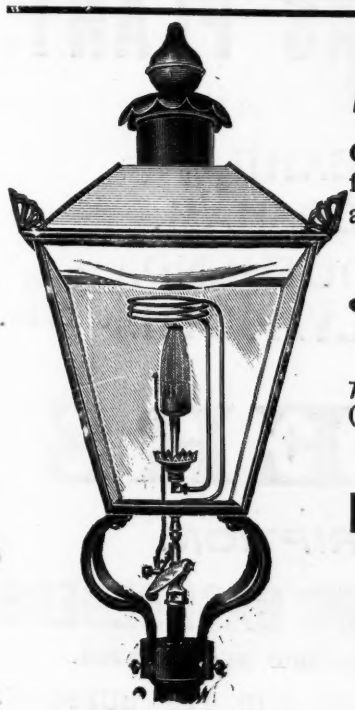

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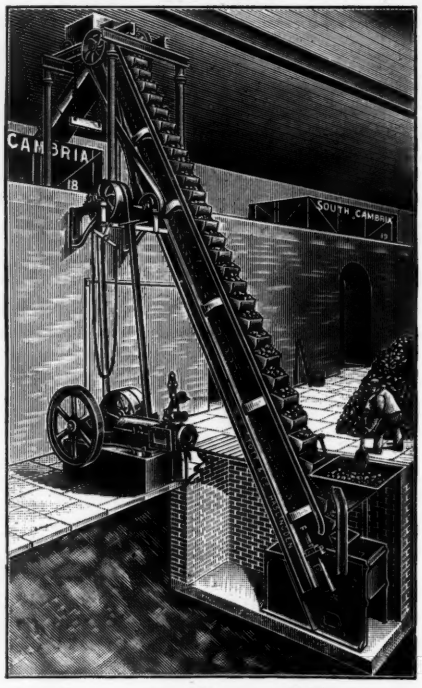

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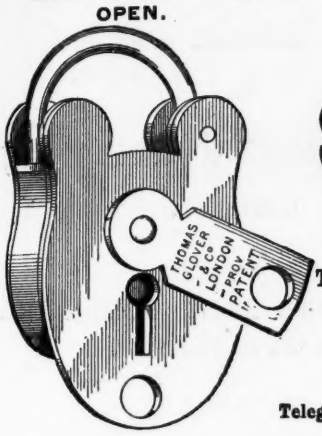

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Prevents Tampering with the

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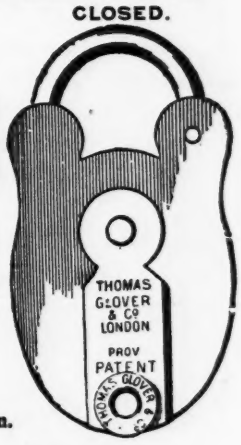

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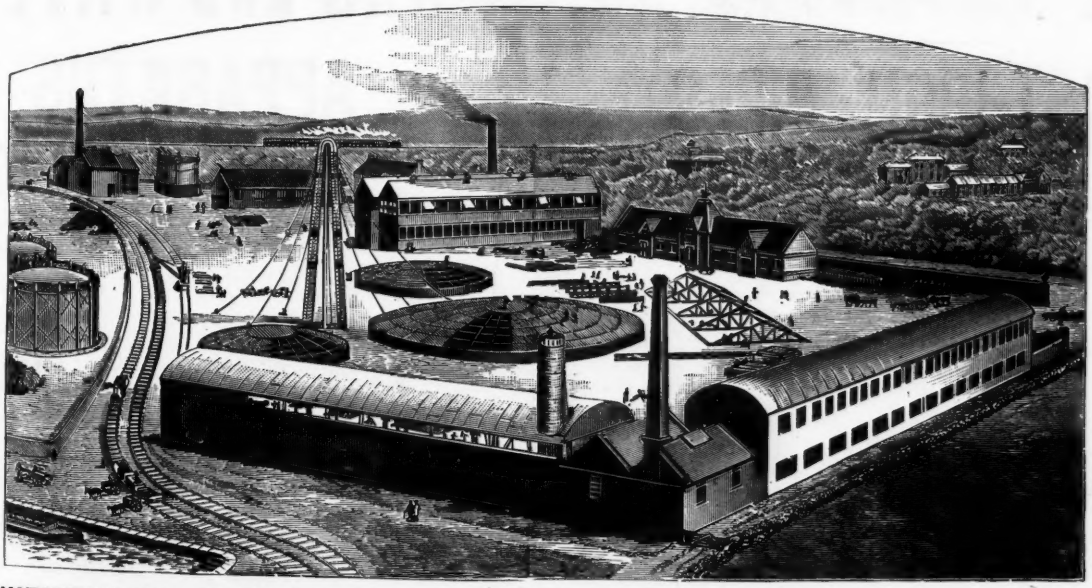

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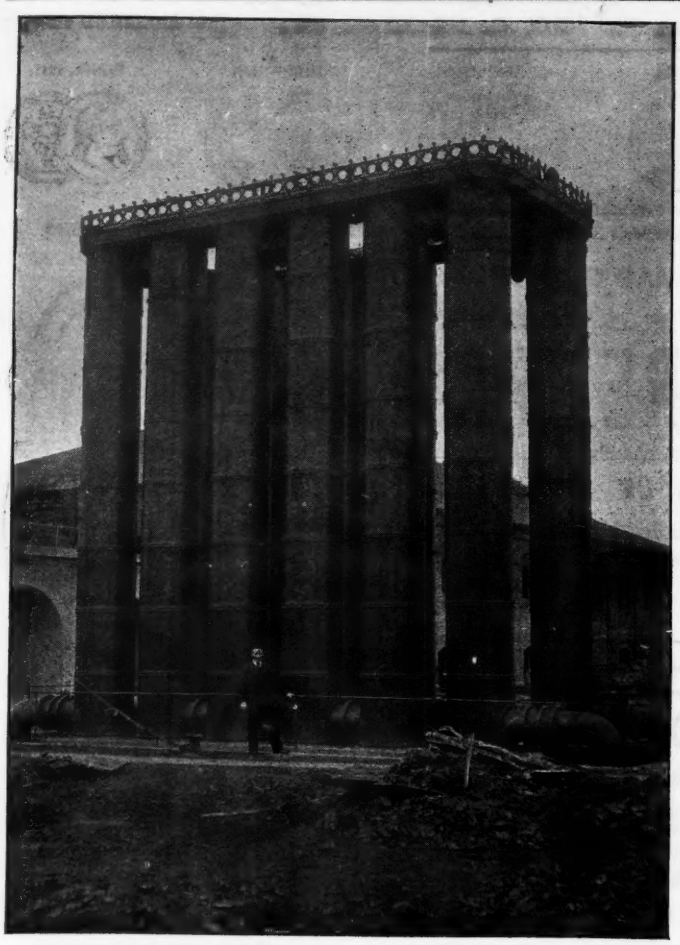

A Set of Twelve Condensers, 3 ft. 6 in. diameter by 30 ft. high. *From a Photograph.*

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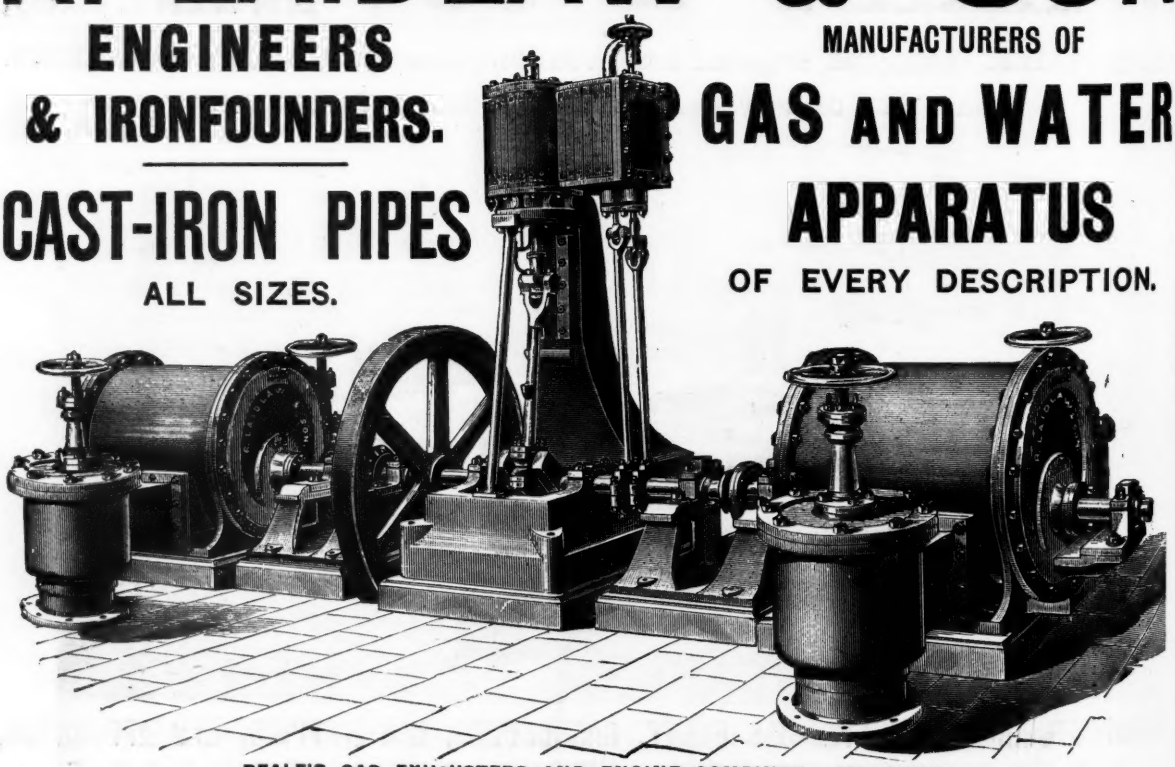

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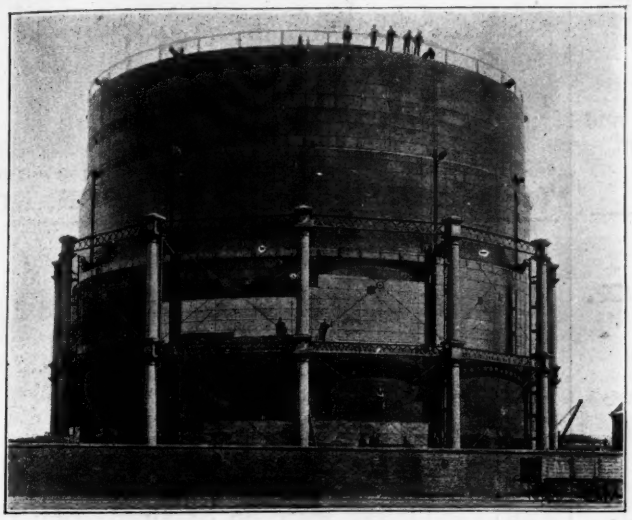

Four-Lift Gasholder, 120 ft. by 24 ft., three Lifts working on Patent Cables (Pease's System). Wallasey; 1897.

Examples of Patent Cables as applied to Enlargement of Holders to be seen at—

BIRKENHEAD . . .	160 ft. × 30 ft.,	2 lifts added.
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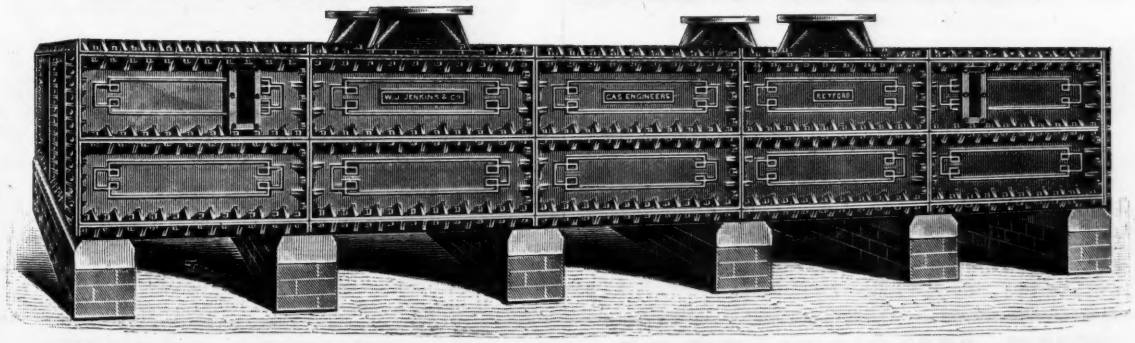

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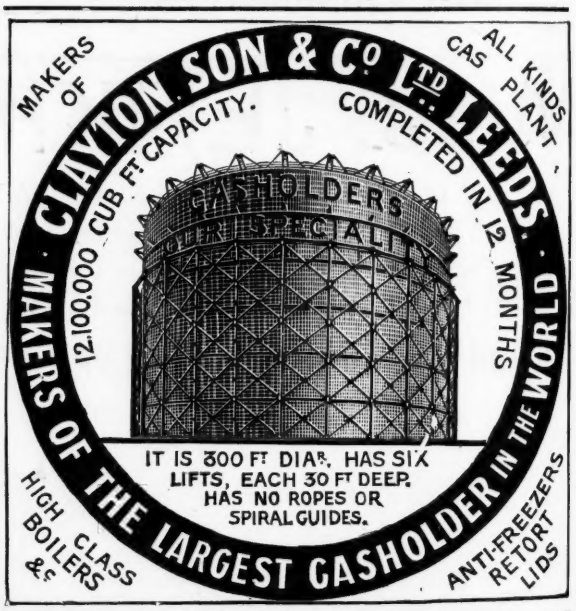
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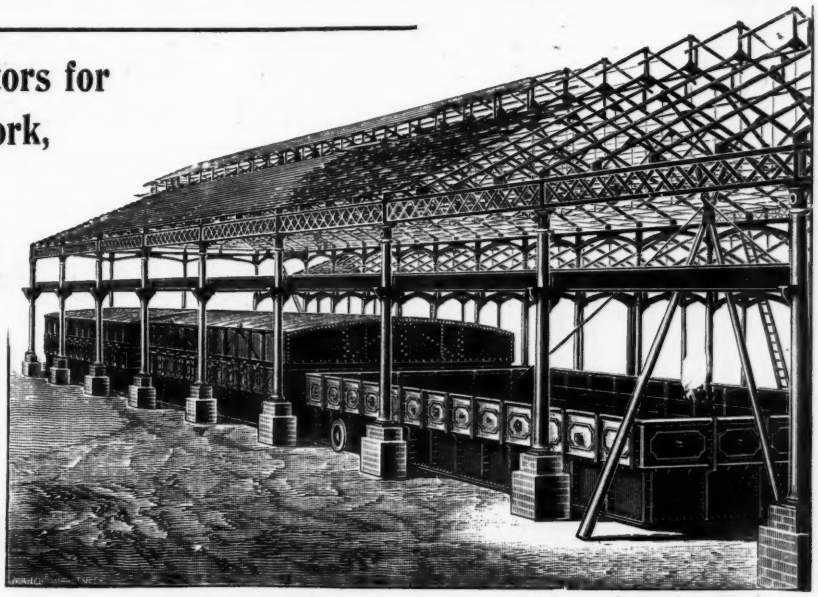

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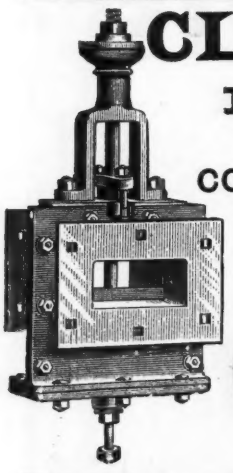

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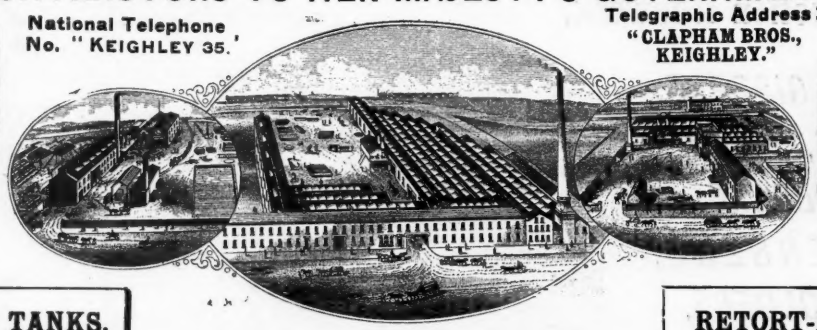

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